GAS

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1950 in Review

Gas Industry Now Worth $8¾ Billion 25

$700 Million in Pipelines 71

JAN 17 1951

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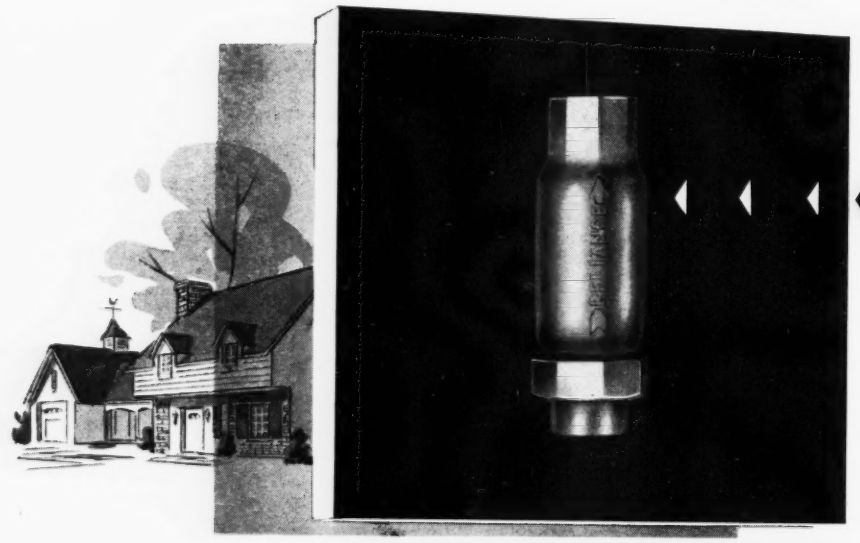

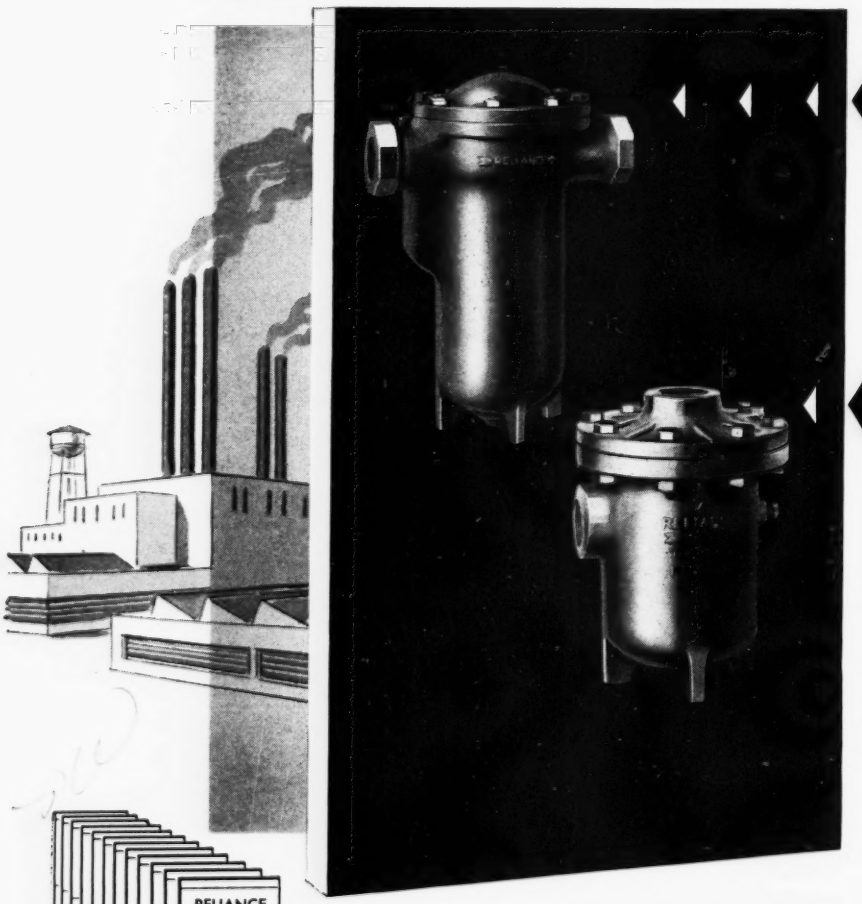

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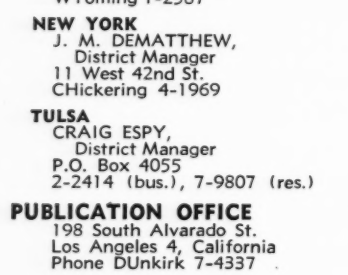

NOW OFF on another job, this ditcher cleared the way for the Texas-to-San Francisco line, which was put in operation at year's end.

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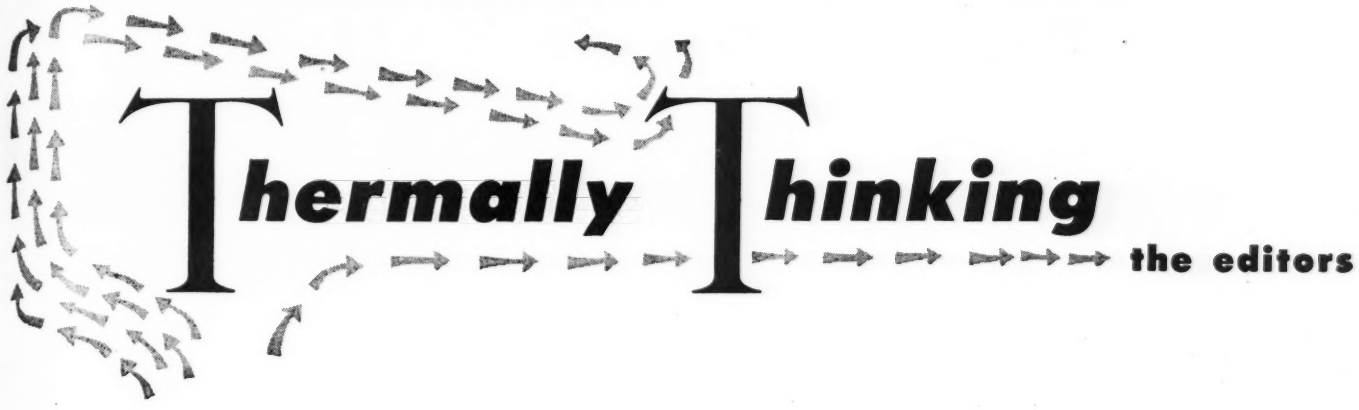

the editors

Somebody's Scared

How're we doing?

When we pose that question, we're not intending to launch into the usual review of last year's accomplishments and failures and next year's prospects. That's covered elsewhere. But maybe, since the new year is just starting, it would be appropriate to take stock of our industry from the long-range standpoint. Where are we, how did we get here, where are we going?

On that basis, how're we doing?

A very good friend of our says not so well.

Let's consider the circumstances: new pipelines have opened up new markets, natural gas has been clothed in glamor, hitherto untouched loads have been accepted, the public has been clamoring for our services. The response to this set of circumstances has been the establishment of new records in every category of the business (except, of course, in manufactured gas sales, which will never be mourned so long as we have plenty of natural gas to take over the load).

The immediate prospects look good.

But our friend is frightened by the long-range outlook. He thinks he sees a "creeping paralysis in our fighting arm." Ours has been a success born of opportunity. The demand is there, our fuel is the finest, our prices are so low as to have little relationship to the value of the service. The tide of battle has favored us, but are we running squarely into our own little Korea?

We know we're running into a battle of costs and rates. As they climb to a point where the best fuel is no longer cheap, will we still be able to sell? Is the tide of politics lapping over this problem at a quickening rate, inundating us in a dual regulation that threatens to wash away at the foundations of company management and to crumble our rate structures?

Most certainly no fair rates will come out of such an eventuality, says our friend.

Are we about to be hammered into submission by the unethical tactics of the big electrical appliance manufacturers? He says they are finding increasing success, helped along by our own complacency.

The trouble, as he sees it, lies in the lack of organization. With only relatively small manufacturers in the field, compared to the electric titans; with sales promotion that falls short of the competition's; with many of our appliance makers straddling the fence, we lack the element of strong backing such as electric companies enjoy.

That throws the burden right back onto the gas utility. And its associations. AGA has courageously pushed ahead with the PAR plan, and periodically it points with pride to the volume of money being poured into it. But what comes out the other end? Is the machinery of gas promotion shaped like a cornucopia or a funnel?

If like a funnel, the trouble must lie in the failure of utilities and manufacturers to follow through, to tie in regularly, to snip the bureaucratic red tape of big utilities to permit the man on the "working levels" to implement the research and promotion that PAR provides.

Perhaps the AGA isn't *really* selling PAR. Goodness knows it talks enough about it, but where and in what terms? Like all executives, it's guilty of talking to itself. It deals with the "big shots"; does it go to the grass roots?

And now—let's take a deep breath and cross our fingers—and take a long, hard look at the influence of combination utilities on gas industry sales. The electric industry's promotion is carried on largely by its manufacturers, and they pull no punches. Our promotion, coming mainly from utilities, must be watered down to what the electric utilities will stand for, or they will veto it. On a national standpoint we dare not tie in too closely with LP-Gas; combination companies will not permit it.

If these combination companies continue to participate in the direction of national promotional policies, is it any wonder that the gap between sales of gas and electric ranges and water heaters is closing?

Given a war-free economy in 1951, would electric range sales actually *pass* gas range sales, as our friend predicts?

Is he off-base, or does he have a valid point? We'd like to hear what our readers have to say.

Of course we *can* refuse to face facts, as the administration did until Korea came along.

Or as we did with automatic range ignition—until Hugh Cuthrell came along.

PAD Knows Our Problems

The recent speech of Bruce K. Brown, PAD's deputy administrator, before the Interstate Oil Compact Commission in Houston was well received in the gas industry, since it emphasized both the necessity of complete cooperation among all segments of the fuel industry and seemed to indicate a desire to be exceedingly fair on the part of PAD in the trying days of allocations to come.

He stressed that the problems of his division were overall and he showed clearly that he understood the ticklish problems involved in "the immediate evaluation of numerous pipeline projects in the light of supply needs and materials available."

"New pipeline projects for both oil and gas are serving notice of needs for very large quantities of pipe," he pointed out. " . . . Implicit in such work is the assumption that steel and other materials will be forthcoming to sustain *and* expand the industry along the lines indicated by the program and that the manpower will be available . . . Materials simply must be forthcoming to sustain the industry. Requirements of materials to expand it must be evaluated in the light of our overall program and the availabilities of additional materials and manpower."

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Technical Trends

guy corfield

Outlook For 1951

Anyone who reviews the contents of *GAS* for 1950 as listed in the Index included in the December 1950 issue will be impressed by the wide variety of articles which, it is believed, give representative and substantially complete coverage of the technical activities and progress of the industry. If the articles are re-read it will be realized that the industry has had an unusually progressive year.

Natural gas supply has been augmented in some areas and newly introduced in many others; and techniques for assuring continuous supply, or producing high-Btu oil gas or LP-Gas air standby have been perfected. Problems of interchangeability, both in distribution and utilization fields, have been exhaustively studied and successfully met. Methods of purification, dehydration, and corrosion mitigation have been well advanced. Manufactured gas plants have been improved as such, or in some instances combined with or converted to LP-Gas operation. Distribution systems have been rebuilt and expanded to handle higher loads. An active program of research and development has stimulated conventional and new uses of gas in industry and in the home.

In the light of such activities it would seem that our industry is well prepared for still greater service and accomplishments in 1951, and should have no fear of the normal problems which may arise. Barring unforeseen happenings beyond control of technology, the outlook for 1951 is good.

Chemicals From "Natural Gas"

The production of chemicals from natural gas, which is part of the more general and relatively new field of petrochemistry, would seem to warrant occasional treatment in gas industry technical writings even though it is of minor economic importance to this industry. The industrial use of petrochemistry could be described as the application of chemical engineering principles to petroleum hydrocarbons to change or interchange or add to molecules so as to form products not previously obtained from petroleum sources.

Petrochemistry is relatively big business, but actually it absorbs only less than .5% of our domestic production of petroleum. Furthermore, as far as natural gas is concerned, the bulk of products obtained through petrochemistry have their starting point in the LP-Gas fraction of propane and butane; a lesser amount of ethane is used; and methane has volume use that is relatively minor. Therefore if natural gas is considered to be the "dry" or "stripped" gas that is transported and distributed by fuel gas utilities, "chemicals from natural gas" is a somewhat meaningless or misleading expression from the gas utility volumetric or economic standpoint. This is why quotation marks have been placed around the words "natural gas" in the title.

Nevertheless, from the technical angle, a brief review of some of the current petrochemical processes for the conversion of light hydrocarbons may be interesting. There is one direct use of natural gas which can perhaps hardly be called petrochemical; that is, burning or combustion to form carbon dioxide, which is purified and produced as liquid or solid (the latter called dry ice). Other uses of natural gas (principally methane) are: by thermal cracking or reforming, to produce hydrogen which is combined with nitrogen to form ammonia, nitric acid and other nitrogen compounds; and by reacting with heat and steam, to form carbon monoxide and hydrogen, or "synthesis gas," which is converted into methanol and formaldehyde. Ethane and propane are thermally cracked to form ethylene, which is the starting point for an almost infinite series of compounds including ethyl alcohol, styrene, thiokol rubber, glycols and plastics. Propane and butane (LP-Gases) are oxidized to form acetic acid and higher alcohols and aldehydes; or can be thermally cracked to make a long list of compounds such as glycerin, alcohols and ketones. Butane when dehydrogenated forms the now well-known butadiene which, with styrene, produces GR-S synthetic rubber.

Well Formation Fracturing

IT IS CONVENTIONAL to apply underground treatment to gas and water wells by injection of inhibited hydrochloric acid. The acid dissolves lime deposits that shut off flow into the well, but does not attack the tubing or casing because of the inhibiting compounds added to it. It has also been found that if the acid is injected with sufficient pressure, the producing formation immediately surrounding the well can actually be fractured to give still greater improvement in production. However, such fracturing can only be accomplished in formations of relatively low permeability, as otherwise the highly fluid acid penetrates into the pores and small fissures before rupturing pressures can be built up.

Dowell Inc., Tulsa, has approached this problem very ingeniously by developing a two-component acid mixture, called Jel-Acid, the fluidity or viscosity of which can be controlled. The two components can be prepared on the job as non-viscous liquids, and separately but simultaneously pumped into the well to unite in the tubing where the mixture thickens to a suitable viscosity to accomplish the desired fracturing. The viscosity can be varied by proportioning the two liquids. After three or four hours this acid mixture *thins down to water-consistency*, so that its dissolving effect is completed and does not impede production from the well.

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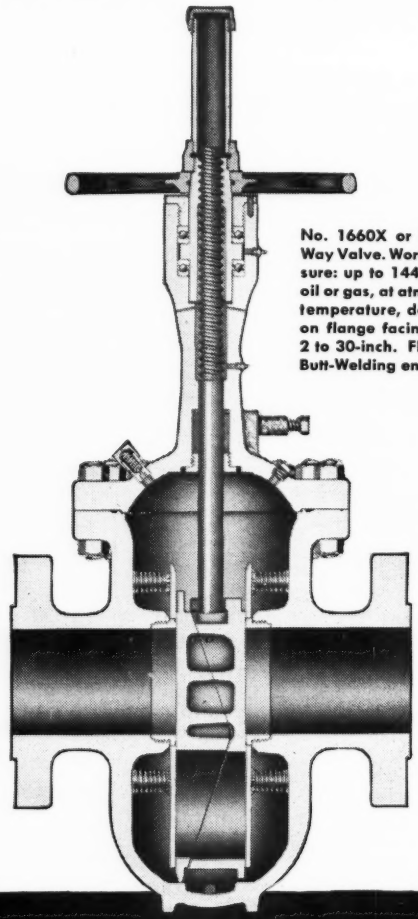

No. 1660X or XH, Full-Way Valve. Working Pressure: up to 1440 pounds oil or gas, at atmospheric temperature, depending on flange facing. Sizes: 2 to 30-inch. Flanged or Butt-Welding ends.

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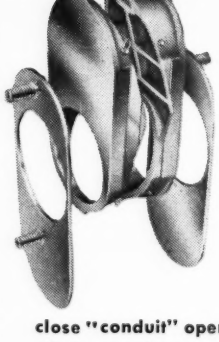
LUBRICATED WORKING PARTS. Body packed with grease to reduce friction and wear of internal parts. Grease provides seal at seats, bonnet joint, and stem, which helps maintain pressure tightness.

DUAL-SEATING DOUBLE DISC wedges tight both in fully open and closed positions. Seals off grease from line fluid; protects disc seating surfaces when valve is open.

ACCURATE DISC GUIDING assures correct seating and prevents cramping or binding the stem.

PRESSURE-TIGHT BOLTED BODY-BONNET JOINT. Line pressure forces synthetic rubber "O" ring gasket into wedge-shaped groove in body flange and helps keep the joint tight.

HOW THEY OPERATE



Double disc wedges tightly against shoulder type body seat rings in both open and closed positions. This protects seat faces from erosion and wear.

Movable spring-loaded plates, shown here, retain grease in body and bonnet while valve is being operated . . . also close "conduit" openings in disc against entrance of grease when valve is partly or fully closed.

Only one half of disc is attached to valve stem. At both ends of its travel, the unattached half of the disc comes in contact with stops. Additional wheel rotation then moves the stem-attached half of the disc farther, forcing both discs outward against seat rings and wedging them there.

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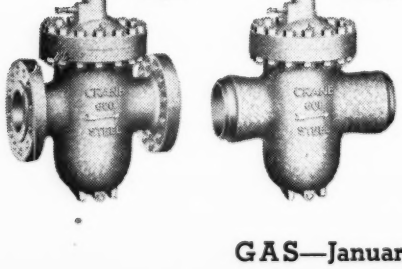

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1950 IN REVIEW

Record of gas industry's growth to an $8¾ billion business recapitulated in year-end report by AGA President D. A. Hulcy.

EACH year since the end of World War II has seen the gas industry registering substantial gains in customers served, in volume of utility gas sold and in the amount of capital invested in plant and facilities. The gas industry has grown from a $5 billion industry to an $8¾ billion industry at the end of 1950.

This spectacular growth was particularly emphasized in 1950 when the gas industry achieved new records in numbers of customers served, in total volume of sales of utility gas, in total gas revenues and in numbers of gas appliances shipped. Capital expenditures for construction and plant expansion reached a new high level in 1950. The transmission and distribution systems of the gas industry today measure more than 375,000 miles, a record mileage for any of the nation's transportation systems.

Forecast Difficult

Many uncertainties in both world and national outlooks make it difficult to forecast the future. The gas industry still has allocated, in its long-range program, nearly a billion dollars for its construction and expansion in 1951. Advertising and promotional plans of the industry for 1951 have as their goal a continuance of the gains made by the industry last year.

If peace prevails there is every reason to believe the gas industry will enjoy a successful year in 1951. At the same time, our industry stands ready now, as it has in the past, to do its full share in helping our nation to meet any emergency that may arise.

Statistics

Gas utilities at the end of 1950 were serving approximately 24,362,000 customers, including about 331,000 customers receiving LP-Gas directly from utility gas mains. This was a gain of 3.3% over 1949 when there were 23,580,000 customers on gas utility mains. Of the total number of customers served, 14,894,000 were receiving natural gas, a gain of 12.7% over the previous year. Manufactured gas customers declined about 14.8% during the year to total about 7,197,000; mixed gas customers on Dec. 31, 1950 totaled an estimated 1,940,000, a gain of 24.8% over 1949. The decline in the manufactured branch of the industry reflects the effect of the changeover by several large gas utility companies to the distribution of straight natural gas or to mixed gas distribution during the year.

Residential gas customers registered an impressive gain during the year, while commercial gas customers also increased substantially. In addition to the customers reported above it is estimated that nearly 6 million customers now are being served with LP-Gas in territories not served by gas utility companies.

Total sales of gas in 1950 amounted to about 4266 billion, a gain of about 15.8% over 1949. Utility sales of natural gas were about 3694 billion, a gain of 18.9%; manufactured gas sales dropped to 412.4 billion, a decline of 2.7%, and mixed gas sales were about 159.6 billion, a rise of 14.4% over the previous year.

Revenues from the sale of gas reached an all-time record in 1950, almost to the $2 billion mark. Utility revenues for the year were $1,958,000,000, a gain of 16% over 1949. Natural gas revenues staged a spectacular rise of 25% to total about $1,363,000,000 for the year. Manufactured gas revenues were $458,700,000, a decline of 4.3% under 1949, and revenues from sales of mixed gas were $114,600,000, a gain of 18.8% over the previous year. The balance in revenues is accounted for by revenues from sales of LP-Gas through utility mains.

Gas Appliances

Sales of gas appliances reached new high levels in 1950, exceeding the record heights achieved in 1947 and 1948 when the industry was filling the tremendous backlog of appliance orders that had accumulated during the war years. Sales of gas ranges last year totaled over 3,100,000 units, compared with 2,100,000 units in 1949 and a previous record of 2,800,000 units in 1948. Automatic gas water heater sales

climbed to a total of 2,250,000 units in 1950, compared with a previous record of 1,800,000 units in 1947 and 1,350,000 units in 1949.

Central heating units also reached a new high level of more than 1 million units, an indication of the tremendous demand that still exists for gas house heating. Gas refrigerator sales were about 50% ahead of a year ago, while sales of the new gas appliances such as the gas laundry dryer and the gas incinerator advanced substantially in 1950. Gas air-conditioning equipment sales also made new records in 1950.

New Facilities

The gas industry's expenditures for construction of new facilities and expansion of present production, transmission and distribution plant last year reached a record level of an estimated $1,060,000,000, attesting to the tremendous effort the industry is making to meet the constantly growing demand for gas. Of this total amount it is estimated that more than $954 million was spent on construction and expansion of natural gas pipeline systems, with manufactured gas companies spending approximately $90 million and mixed gas companies investing nearly $15 million for new plant and expansion of present facilities.

The American Gas Assn. resurveyed the gas industry's expansion program last year and estimates indicated that about $3,154,000,000 would be spent in the five-year period 1950-1954, with approximately $2.75 billion of this amount being devoted to construction and expansion of natural gas facilities. While it is believed that 1950 will be the peak year of this program, it is estimated that more than $875 million will be spent on gas industry expansion next year if no restrictions are placed on vital materials.

Natural Gas Progress

The natural gas industry reached new peaks in 1950 and showed every indication that it will progress further in the year ahead. Natural gas pipeline systems added record mileage, customers, sales, and revenues as the natural gas branch of the industry reached new high levels, with natural gas supplying a record-breaking total of 20% of the total energy consumed in the United States in 1950.

(For more information on this branch of the industry, see Pipeline Section.)

Natural gas reserves continue to appear ample to serve the nation for many years to come, even with the rapidly increasing production of natural gas. The association's committee on natural gas reserves estimated at the beginning of 1950 that proved reserves of natural gas totaled 180.3 trillion cu ft, an increase of 6.5 trillion over proved reserves at the beginning of 1949. Natural gas production during 1949 was estimated at 5.9 trillion cu ft, so new discoveries and extensions of estimates of known fields continue to exceed the yearly production.

Manufactured Gas

Despite the tremendous growth of our natural gas transmission systems, the manufactured gas branch of the industry continues to be of the utmost importance in the nation's economic picture. Demand for gas services continues to exceed the ability of the industry to serve this demand in many areas. This is particularly true as regards househeating and its attendant peak-load problems.

While some of the territories receiving or about to receive natural gas will change over to straight natural gas distribution, there are many companies that will continue to manufacture gas and will use natural gas only as one of the production materials. Other companies will mix manufactured and natural gas to be served, perhaps at higher-Btu levels, but still relying heavily on the manufactured gas plants.

AGA Laboratories

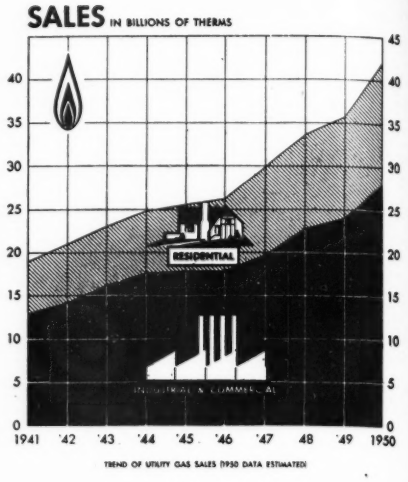
1950 marked the 25th anniversary of the AGA Laboratories and of the founding of the Laboratories Approval Plan for the certification of gas appliances. Appropriately, the year was one which set an all-time record for services rendered. It also marked specific actions important to the continued growth and progress of the industry.

Establishing a new peak in total services to the industry for the fourth successive year, the gross volume of all operations passed the million-dollar mark. Appliance testing and inspection services, the major activities, exceeded those of 1949 by about 20%. More than 4400 individual appliances were tested at the laboratories and more than 1100 inspection calls on manufacturers resulted in examinations of more than 5000 basic models. These figures include United States and Canadian testing and inspection services.

Lab Revenues

Total laboratories revenues exceeded the previous year's by approximately 10% and were five times greater than the prewar 1936-40 average. The greatest gain was in the number of domestic heating appliances tested, although the expansion of sales in all domestic equipment set the pattern for laboratory operations.

Measuring T


SALES IN BILLIONS OF THERMS
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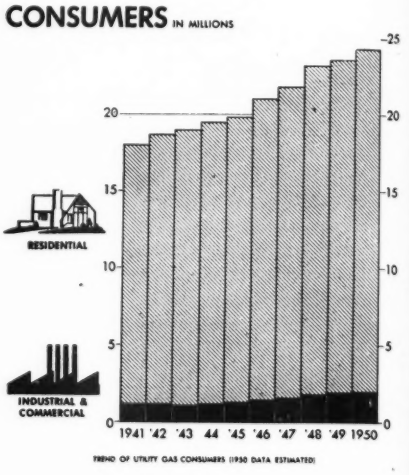
1941 '42 '43 '44 '45 '46 '47 '48 '49 1950
TREND OF UTILITY GAS SALES (1950 DATA ESTIMATED)


CONSUMERS IN MILLIONS
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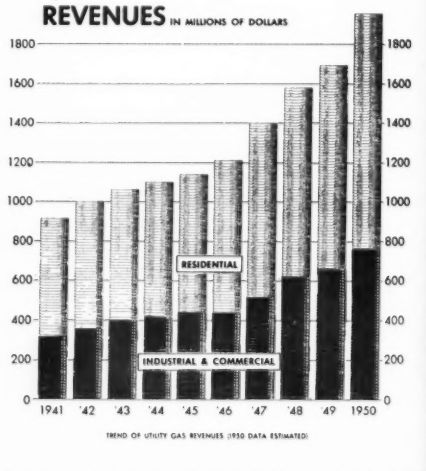
1941 '42 '43 44 '45 '46 '47 '48 '49 1950
TREND OF UTILITY GAS CONSUMERS (1950 DATA ESTIMATED)


REVENUES IN MILLIONS OF DOLLARS
RESIDENTIAL
INDUSTRIAL & COMMERCIAL
1941 '42 '43 '44 '45 '46 '47 '48 '49 1950
TREND OF UTILITY GAS REVENUES (1950 DATA ESTIMATED)

Research activities, conducted under the association's PAR plan, resulted in the preparation and release of 12 research publications. Eight research bulletins and four research reports were issued, pertaining to domestic, mixed gas, industrial and commercial research.

Ground was broken last year for the

owth Of Gas In 1950

ALL GASES

Sales*	1950	1949	Percent Change
Residential	13,931,000	11,718,000	+18.9
Commercial	4,060,000	3,691,000	+10.0
Industrial	22,661,000	19,050,000	+19.0
Other	1,283,000	1,260,000	+ 1.8
Total	41,935,000	35,719,000	+17.4

NATURAL GAS

Sales*			
Residential	11,615,000	9,471,000	+22.6
Commercial	3,457,000	3,116,000	+10.9
Industrial	22,016,000	18,415,000	+19.6
Other	1,256,000	1,227,000	+ 2.4
Total	38,344,000	32,229,000	+19.0

MANUFACTURED GAS

Sales*			
Residential	1,455,000	1,498,000	— 2.9
Commercial	366,000	374,000	— 2.1
Industrial	334,000	336,000	— 0.6
Other	19,000	24,000	.....
Total	2,174,000	2,232,000	— 2.6

MIXED GAS

Sales*			
Residential	811,000	698,000	+16.2
Commercial	214,000	178,000	+20.2
Industrial	307,000	295,000	+ 4.1
Other	8,000	9,000	.....
Total	1,340,000	1,180,000	+13.6

*In thousands of therms.

ALL GASES

Customers*	1950	1949	Percent Change
Residential	22,450,000	21,740,000	+ 3.3
Commercial	1,790,000	1,724,000	+ 3.8
Industrial	100,000	99,000	.....
Other	22,000	17,000	.....
Total	24,362,000	23,580,000	+ 3.3

NATURAL GAS

Customers*			
Residential	13,650,000	12,072,000	+13.1
Commercial	1,175,000	1,077,000	+ 9.1
Industrial	54,000	51,000	.....
Other	15,000	10,000	.....
Total	14,894,000	13,210,000	+12.7

MANUFACTURED GAS

Customers*			
Residential	6,675,000	7,870,000	—15.2
Commercial	485,000	536,000	— 9.5
Industrial	31,000	37,000	.....
Other	6,000	6,000	.....
Total	7,197,000	8,449,000	—14.8

MIXED GAS

Customers*			
Residential	1,825,000	1,463,000	+24.7
Commercial	100,000	81,000	+23.5
Industrial	14,000	10,000	.....
Other	1,000	1,000	.....
Total	1,940,000	1,555,000	+24.8

*As of Dec. 31 (1950 estimated)

ALL GASES

Revenues	1950	1949	Percent Change
Residential	$1,195,000,000	$1,031,293,000	+15.9
Commercial	263,000,000	238,077,000	+10.5
Industrial	476,000,000	395,559,000	+20.3
Other	24,000,000	23,666,000	+ 1.4
Total	$1,958,000,000	$1,688,595,000	+16.0

NATURAL GAS

Revenues			
Residential	$ 759,000,000	$ 590,980,000	+28.4
Commercial	169,000,000	144,652,000	+16.8
Industrial	414,000,000	335,454,000	+23.4
Other	21,000,000	19,649,000	+ 6.9
Total	$1,363,000,000	$1,090,735,000	+25.0

MANUFACTURED GAS

Revenues			
Residential	$ 337,900,000	$ 354,929,000	— 4.8
Commercial	73,000,000	75,465,000	— 3.3
Industrial	45,000,000	45,271,000	— 0.6
Other	2,800,000	3,455,000	.....
Total	$ 458,700,000	$ 479,120,000	— 4.3

MIXED GAS

Revenues			
Residential	$ 82,600,000	$ 69,333,000	+19.1
Commercial	15,300,000	12,513,000	+22.3
Industrial	16,200,000	14,111,000	+14.8
Other	500,000	485,000	.....
Total	$ 114,600,000	$ 96,442,000	+18.8

construction of a large addition to the Cleveland laboratories. This action, following a similar expansion at the Pacific Coast branch, a year earlier, will place the laboratories in a position to handle more efficiently the heavy volume of services they are called upon to provide.

Residential Gas

During 1950, the residential gas section, in cooperation with the general promotion planning committee, the national advertising committee, and the AGA promotional bureau conducted sales, promotional and advertising campaigns on all of the seven major domestic appliances. Each of these promotions — particularly the gas range "Spring Style Show" and the "Old Stove Round Up"—received excellent support from both gas utility companies and gas appliance manufacturers, and were important factors in achieving the rec-

Heavy Outlays Predicted

If predictions made prior to the "new war" in Korea mean anything, gas utilities will join the rest of the major industries in the United States in setting new records for plant and equipment expenditures in the first quarter of 1951.

This picture was painted by the Department of Commerce and the Securities & Exchange Commission in a mid-December report based on their latest survey of capital outlays. Authenticity of the figures must, however, be weighed against recent international developments, as the survey was conducted from mid-October to mid-November.

Outlays for all industries are estimated at $4.8 billion, 30% up from actual first quarter expenditures in 1950. Whereas last year only gas and electric utilities expected to increase their investments over 1949, all industries will contribute in the coming quarter.

In the period, utilities plan to spend $740 million, up $60 million from last year but down $250 million from that spent in the final 1950 quarter — a natural seasonal dip. Given a normal consant rise with each succeeding quarter, utilities' outlays could easily set a new annual record.

For the year 1950, gas and electric utilities established a new top of $3,220,000, beating 1949's showing by $80 million.

ord sales of gas appliances made last year.

Last year saw the completion of a series of effective handbooks or "sales makers" on all domestic gas appliances, sponsored by the appliance committees of the section for use by gas company and dealer salesmen. These sales makers have been widely accepted by the industry.

The gas house heating committee completed a pocket-size manual, "Guide for Installers of Gas Central Heating Systems, Conversion Burners, Etc." that has sold more than 17,500 copies and is in its second edition.

Other industry achievements in 1950, reported in brief:

Home Service. Utilities increased their home service personnel by 20% to a total of 1400. Nearly 10 million customer contacts were made. Departments cooperated with the American Standards Assn. in setting up baking utensil standards. A new booklet of prize-winning gas range demonstrations was issued.

Industrial and Commercial. Industrial gas revenues were up 20%, commercial up 10.5%; combined revenues accounted for more than 39% of total gas revenues. World conditions caused postponement of promotional activities in the final quarter of 1950.

Accounting. In cooperation with electric utility accountants, gas accountants prepared industry's views on excess profits taxes.

Operating. Two outstanding conferences were held—the distribution, motor vehicle, and corrosion meeting, and the production and chemical conference. More than 1500 attended.

Accident Prevention. The industry's first national conference on safety was held in 1950. Certificates of award were presented for outstanding safety achievements.

PAR Plan. Intensified activity in the plan's sixth year brought aggregate contributions to more than $9 million. Spring and summer promotional campaigns were highly successful. World conditions took the edge off the fall and winter campaigns planned, but many utilities continued to push sales to record-breaking levels.

National Advertising. Of $6 million spent in advertising residential gas appliances, newspapers were allotted $3.2 million, magazines $2.8 million. AGA spent $120,000 promoting industrial and commercial uses. Clothes dryers were heavily advertised, and gas incinerators and all-year air conditioners were beginning to share in the investments.

Promotion. Four major campaigns to increase sales of gas appliances were conducted during 1950. February and March were devoted to a "Size 'Em Up" campaign featuring water heaters and clothes dryers. During the two months sales of gas water heaters increased 72.7% over the comparable period in the previous year. A "Spring Style Show" campaign for automatic gas ranges was launched in April and proved most effective.

"Clean Sweep"

In July a "Clean Sweep" drive to sell refrigerators was launched in cooperation with Servel Inc., and this campaign aided in lifting sales of gas refrigerators more than 50% above a year ago. This was followed by a "Sell 'Em Comfort" campaign on house-heating, air conditioning, and incineration. "How-To-Do-It" books were prepared for each of these campaigns, with plans for complete sales and promotional campaigns for gas utility companies. As noted previously in this report, the "Old Stove Round Up" campaign scheduled to open in the fall was partially blocked by the serious aspect of affairs in Asia. Many companies carried out their original plans to stage Old Stove Round Up promotions to the fullest extent. Other companies participated in varying degrees, helping to lift sales of automatic gas ranges to the all-time peak of 3.1 million units for the year.

The promotion bureau is producing a series of "Big Ten" booklets, listing the 10 most important questions to be considered in selling each of the seven domestic gas appliances, and additional books devoted to househeating, gas laundries, and natural gas. Six of the booklets were produced in 1950 and the other four will be ready early this year.

Spearheaded by Hugh H. Cuthrell, a project on automatic range ignition development was launched. At year-end the project was well advanced. Some 200 gas ranges each equipped with one of the 10 different ignition systems under consideration, are being field tested, and from these tests, it is believed, a single point ignition system for gas ranges will be developed that will consume little or no energy when not in use.

Uncertainties cloud the horizon for 1951, but promotional plans of a flexible nature have been approved for the coming year. The promotion bureau has mailed gas utility companies the plans and material for use in an "Early Bird" campaign on gas incinerators, automatic clothes dryers and water heaters, together with a three-month calendar listing dates national advertising on these appliances will appear in leading magazines.

New Freedom Gas Kitchen. Nearly 100 copies of the new film, "New Freedom in Her Modern Gas Kitchen," were sold to utilities. A four-color book on home planning was also published. Excellent contacts have been made with leading home magazines for promotion and publicity.

Research. Production research has centered on peak shave, emergency supply, interim gases. "Interchangeability of Oil Gas and Natural Gas" is a new project. Venting, ignition, and combustion are being studied in some of the 20 utilization projects under way.

Statistical Bureau. Accomplishments included publication of "Gas Facts," distributed to 3000 outside groups as well as to gas companies; the third annual review of house-heating customers, a survey of residential gas service by counties, a construction expenditure survey covering 1950-54, estimates of steel requirements, and the economic effects of gas conversion.

Utilization. Studies were made of comparative fuels and appliances, work was done on model ordinances, revision of standards on the installation of gas piping were made official by ASA, comparative meat shrinkage tests were conducted to disprove claims of the competition, fuel replacement factors were given the government to aid gas utilities in bidding on federal housing projects.

Publicity. Broader uses were made of the various media, and television came into acceptance among gas companies and manufacturers.

Publications. A publications bureau was set up in 1950. The *AGA Monthly* won the highest award from the International Council of Industrial Editors for the fourth consecutive time.

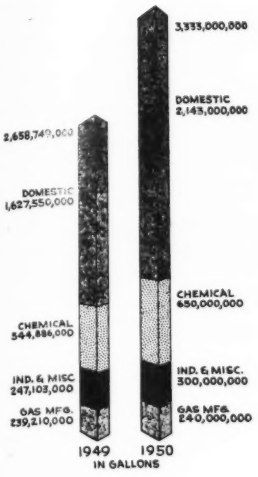
Conclusion

There are many factors that point the way to a continuation in 1951 of the record-breaking achievements of 1950. Except for a few areas, the gas supply problem is rapidly being solved with the growth of the natural gas system and the technical advances in manufactured and mixed gas plants that are helping to meet peak loads. Our member companies continue to back their faith in the future of the industry with their contributions to the PAR plan.

Rising costs of producing, transmitting, and distributing gas indicate some further rate adjustments may be necessary, particularly if the tax burden of the gas utilities is increased heavily. Shortages of materials, resulting from a heavy conversion to war production, might necessitate delays in construction and expansion programs as well as limiting supplies of appliances. These are matters mostly beyond the control of the gas industry.

Motor fuel application a big factor

LP-Gas Sales Tempo Quickens; Use for Gas Making Holds Steady



TRIPLING its volume since 1945, the LP-Gas industry in 1950 served more customers than did manufactured gas utilities and two-thirds as many as natural gas utilities, according to the latest annual review released this month by K. W. Rugh and G. R. Benz, of Phillips Petroleum Co.

In barely 25 years, U. S. LP-Gas activity has grown from a fringe-area operation to an adult, bustling enterprise of major importance to the national industrial scene and to national defense planning. In 1950, the industry's growth continued, racking up a solid 25.4% increase over 1949's sales total with 3,330,000,000 gals. sold in the last 12 months. This figure excludes use of butane and propane in the manufacture of aviation and motor gasoline and synthetic rubber, according to Mr. Rugh and Mr. Benz.

Breakdown

Breaking the picture down by its individual subsections, the Phillips executives reported that:

In domestic use, 2,143,000,000 gals. of LP-Gas were consumed in 7.5 million home installations in 1950. This amount is greater than the nation's *total* use for the year 1947 and is a 31.7% increase in domestic sales over 1949. The industry's new promotional program, initiated last year, has more than 600 company-participants, and success seems assured. In 1950, about 713,000 gas ranges were built specifically for LP-Gas use, an estimated 315,000 gas-fired automatic gas water heaters produced in 1950 are being fueled by LP-Gas, and 20% of the gas-fired direct heating equipment and 12% of the gas-fired floor furnaces manufactured last year were made for LP-Gas.

More than 100,000 LP-Gas conversion kits for farm tractors were sold in 1950, and this important trend continues apace. Supplying the new demand for LP-Gas home-heating has helped increase the number of bulk plants to a present total of 4000.

In industrial use, sales scored the greatest annual increase in 10 years, totalling 300 million gals, a 21.4% increase over the previous year. A generally high level of all U. S. business plus the effects of the national military preparedness program are credited with causing this increase.

Utility Use

In use by utilities for gas manufacture, LP-Gas distribution was about equal to that of 1949: about 240 million gals. Early-year warm weather and the increased availability of natural gas were pointed out as factors holding totals down. A downward trend in sales of LP-Gas for peak shaving and standby is not expected, however.

During 1950, 439 communities were served by 288 utilities with LP-Gas exclusively.

In chemical manufacture use, LP-Gas sales were at an all-time high, reaching 650 million gals.—a 19.3% increase. This field continues to be the second-largest market, behind domestic sales. (It should be remembered that an additional 207 million gallons were used in the manufacture of synthetic rubber during 1950, but were not included in this report.) Placement of new chemical manufacturing plants in new areas is now often dependent on the proximity of LP-Gas supplies.

In motor fuel use, a tremendous surge of interest was felt by the industry. Farm tractor conversion to butane-propane increased in frequency with the development of new carburetion equipment (sales figures for tractor use and for bus use were reported under "domestic" and "industrial" headings, respectively). The feasibility of using LP-Gas for large metropolitan buses has been established, and 1950 saw large orders placed for the specially designed buses now being manufactured. One single order from a metropolitan transit authority called for purchase of 500 new LP-Gas-fueled buses. Engines with 12-1 compression ratios are now being manufactured, and will contribute greatly to efficiency potentials. Other prominent uses for LP-Gas as an internal combustion engine fuel include taxicabs, truck fleets, mining equipment, construction machinery, and poultry brooders.

Limiting Factors

In any consideration of the future of the LP-Gas industry, possibly limiting factors must be kept in mind. As the petroleum industry is supplied with the steel it needs for construction, so will the supply of LP-Gas increase. Sales-wise, almost all categories should continue to rise rapidly, with perhaps the greatest increase in use being in the tractor-bus-truck market. The increased national defense effort will have a major effect on the use of butane and propane for other than consumer ends, of course. Industrial use, for example, will increase.

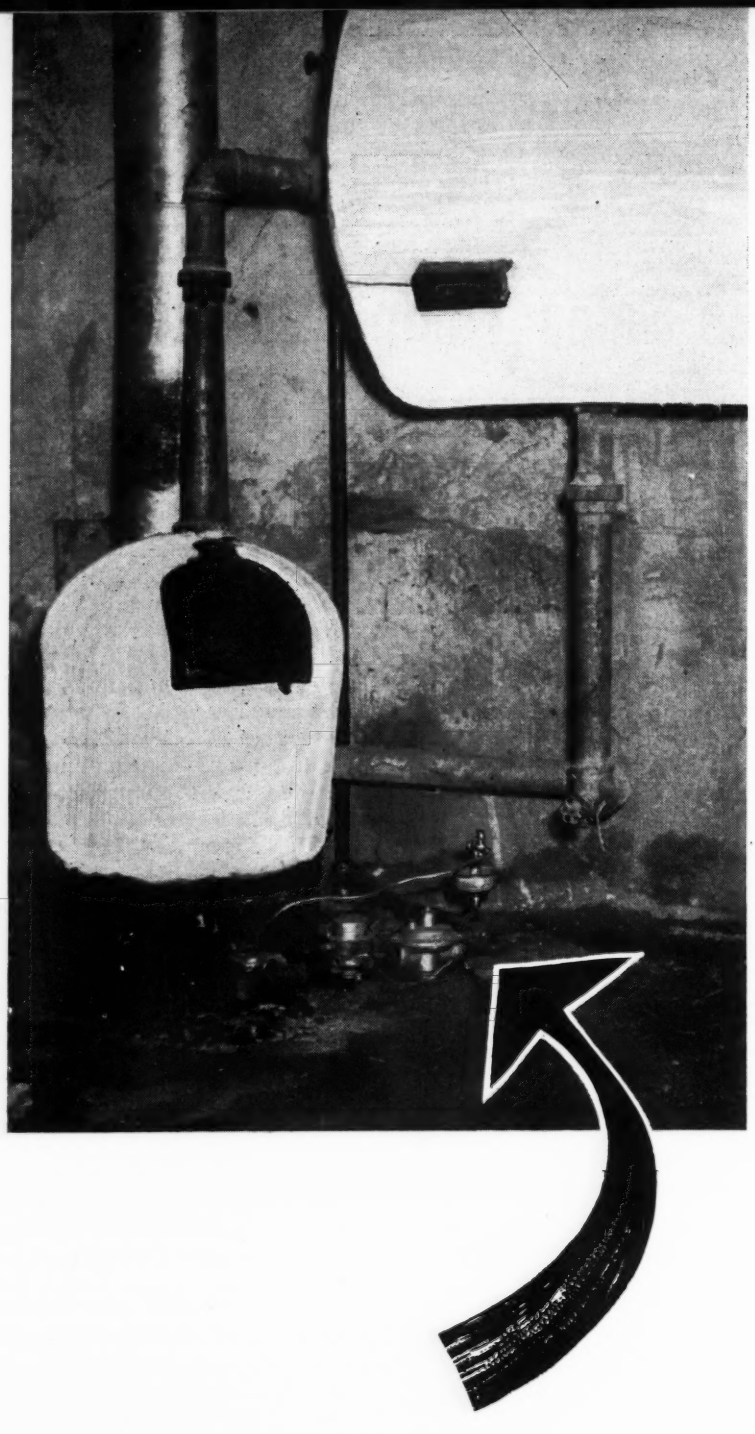
Supplies of LP-Gas are now entirely adequate to meet current needs, the authors stated.

After 1949's temporary slowdown in the tempo of sales increases, the LP-Gas industry climbed back on the escalator in 1950. After having recorded gallonage hikes varying from 15% to 50% over the past decade and a half, the industry in 1949 entered a period that in this fast-growing business amounted to almost a slump. Sales gained but 5.9% over 1948. But 1950's percentage gain was back to the average — 25.4%, equal to 1948's gain and only a few points off the real postwar boom years of 1946 and 1947.

As pointed out in this report, gains in gas manufacturing use were negligible in the past two years—a natural result of warm weather and the invasion of natural gas into areas formerly using LP-Gas for gas making.

Readers wishing to make a comparison of sales gains since 1940 are directed to the Jan. 1949 issue of GAS, p. 36—or for the last 29 years, to the current issue of our affiliate, Butane Propane NEWS.

The author, Mr. Rugh and Mr. Benz, are respectively manager of the Philgas division and manager of the chemical engineering division of the research and development department.



A TYPICAL installation in a seven-family apartment house. The average consumption of gas in apartment houses of this size is 28 MMcf per month of 540-Btu gas, which represents a monthly bill of about $33 in Brooklyn.

Gas Wins Volume Water Heating Load with Converted Coal Pots

By Harry B. Wilson

THE Brooklyn Union Gas Co. has been conducting a special investigation of the opportunities in the volume water heating field during the past few years. It was found that the market resolved itself into two distinct classifications: the small apartment houses (4 to 12 families) and the large ones (12 to 100 and up). Furthermore, it was learned that the smaller houses represented a predominantly year 'round load and the larger ones an off-peak or summer load. This conclusion is dictated by the economies of the various fuel costs in our area. Because of the relatively high cost of manufactured gas, it is to be expected that there would be a certain limit on the size of the apartment house which could afford to use gas year 'round. This limit was found to be about 12 families.

Exclusive

This report is based largely upon our experience in the smaller apartment houses. We were pleased to learn almost immediately that we could avoid installing expensive gas-designed copper coils of some 200,000 Btu/hr input with a large storage tank. Instead we learned that much less expensive side arm water heaters of considerably lower input could supply larger houses than heretofore thought possible. As a matter of fact, we found that a small 75,000 Btu/hr side arm copper coil heater could easily supply sufficient hot water for a six-family house with the usual storage tank size based upon about 25 gals. per family.

Short Coil Life

A year or so later we found, much to our chagrin, that the coil's life was abnormally short. It was discovered that the coils would frequently fail in little more than a year. While satisfactory coil life had been encountered in the case of 30,000-Btu side arm heaters commonly found in private houses, we found that the relatively long hours of operation of a 75,000-Btu heater in a six-family house would greatly shorten the life of the coil. About eight such failures in small apartment houses caused us to discontinue the sale of such equipment. This resulted in our investigating the practicability of converting "bucket-a-day" coal pots to gas.

Mr. Wilson is commercial sales manager, Brooklyn Union Gas Co.

During the first phase of our investigation, we found that some attempts had been made in the past to convert coal pots with little or no success. Our recent success in firing large apartment brick-set househeating steam boilers with fuel door burners having inputs of only about 7% of rated input led us to think that we should make another attempt at converting coal pots. We felt justified in making this effort because of the estimated 12,000 coal pots installed in our territory in 4- to 12-family houses.

Secret Combination

Without resorting to the extreme in a radiant-type burner we were able to obtain unexpectedly high efficiency. The secret was a combination of a low input and the use of a horizontal circular baffle a little smaller than the diameter of the coal pot. See *Figs. 1* and *2*.

Briefly, the more important findings disclosed during our investigation are:

1. *Input*—Experience has shown that much lower inputs can be used than at first had been thought. Our experience in this market to date indicates that about 4000-Btu input her hour is sufficient for the average family using about 60 gals. of hot water a day. This is based upon a storage tank being available with a capacity of from 20 to 25 gals. per family. An effort has been made to reduce the input to a minimum in the interests of obtaining long hours of operation for the reduction of standby losses. It seems practical at this time to set the input to result in about 20 hours of operation a day. In this case it is likely the burner will shut off only once a day, usually about 3 o'clock in the morning and will start again around 7 o'clock in the morning.

Efficiency: 62-77%

2. *Efficiency*—It is relatively easy to obtain a combustion efficiency of about 77% when using an ash pit-type burner, a flame spreader and a horizontal circular baffle 6 or 8 in. above the flame spreader. This baffle has a clearance of only a fraction of an inch between its edges and the inside wall of the coal pot, thereby forcing the fuel gases through this narrow space to provide an efficient scrubbing action. Draw tests run in the laboratory of Brooklyn Union Gas Co. gave a boiler efficiency of about 62%. It is felt that this relatively low efficiency as compared to domestic storage type water heaters is compensated for by the elimination of much of the standby loss because of long hours of operation.

3. *Consumption*—The average consumption is about 4000 cu ft/month (540-Btu gas) for a family using from 50 to 60 gal of water daily. In several instances we have been able to close the sale by stating that we would adjust the burner input so that the gas bill could not exceed the figure which the customer had in mind. This is an ideal answer for the customer who has a fear that the bills may greatly exceed the salesman's estimate. The long hours of operation, close to 24 hours in some cases, makes this possible. The relatively poor hot water service which many tenants are accustomed to makes our job less difficult.

4. *Aquastat Location*—Experience to date indicates that it is best to locate the surface strap-on-type of aquastat about ⅔ down from the top of the tank. It is felt, however, that future experience may indicate the desirability of locating this aquastat somewhat higher.

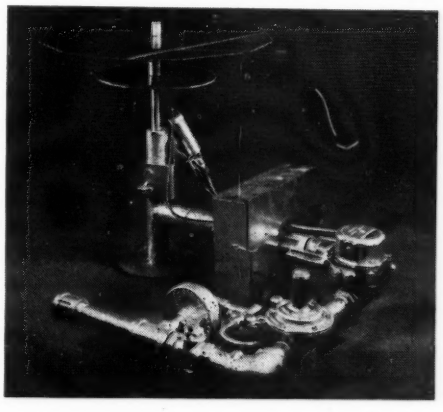
Costs

5. *Installation Costs*—The installation consists of the following:

(a) Installing ¾-in. gas line (540-Btu gas).
(b) Insertion of burner into coal pot after removal of grates.
(c) Cutting horizontal baffle to give desired clearance.
(d) Strapping on the surface aquastat.
(e) Connection of millivolt wiring.
(f) Wire brushing interior of coal pot.
(g) Installation of relief valve.
(h) Installation of diverter.
(i) Installation of fixed baffle through slot in flue to restrict chimney pull.

It is roughly estimated that this represents the work of two men over a period of about four hours.

6. *Equipment Costs*—It is expected that the eventual net cost of the ash pit fountain type burner as manufactured by the E. C. Lundt Co. Inc. will be about $35. The price of the burner includes the pilot generator, gas valve, surface aquastat, and pressure regulator completely asembled. The importance of this type of conversion work lies in the fact that an installation, including labor, can be made in a six-famiy house, for



MINIATURE BURNER, showing millivolt pilot generator with gas valve, flame spreader, and horizontal baffle. Surface aquastat, strapped on storage tank, is supplied with burner, but not shown here.

example, for $120 or less as compared to about $650 for the conventional type of equipment. The fact that it is not necessary to change the water connections, as must be done with a side arm water heater, has much to do with making the connection work less expensive.

Mention was made heretofore of the predominantly year 'round nature of the load in the small apartment house field. We found that about 20% of our sales were made in houses where the customer reinstalled the grates and used coal during the winter months. These houses were the larger ones of 8-family to 15-family size where the customer utilized our off-peak rate. This requires a minimum of $26 per month, but makes gas available at 62.5 cents/Mcf of 540-Btu gas rather than the year 'round rate of about $1.18/Mcf which would be expected for this size houses. We now have hope of some manufacturer designing a fuel door burner which could be used in all cases whether year 'round or off-peak.

Profit Margin

We estimate that the sale of a coal pot conversion burner in a small apartment house, averaging six apartments, is equivalent in added load to the sale of about six domestic water heaters with the advantage of higher rate and lower service cost per unit of added power.

Brooklyn Union is eyeing this potentially large year 'round, high revenue market very seriously. We believe that the use of natural gas in sending out a mixed gas recently will improve our competitive position. Our rather modest promotional efforts at this time are intended to provide necessary experience so that we will be able to take advantage of future opportunities in this lucrative market. We expect that a continuation of this activity—the application of a newly developed gas-designed storageless immersion coil boiler, and the use of recently developed large atmospheric fuel door burners—will enable Brooklyn Union to capitalize on the opportunities which will develop as we use more natural gas as a component of our sendout gas.

The Economic

By G. K. Bachmann

Part II

IN THIS SECOND and concluding installment of his studies of meter economics, Mr. Bachmann reveals in detail a recently developed method which his company, Public Service Electric & Gas of Newark, N. J., uses in making maintenance

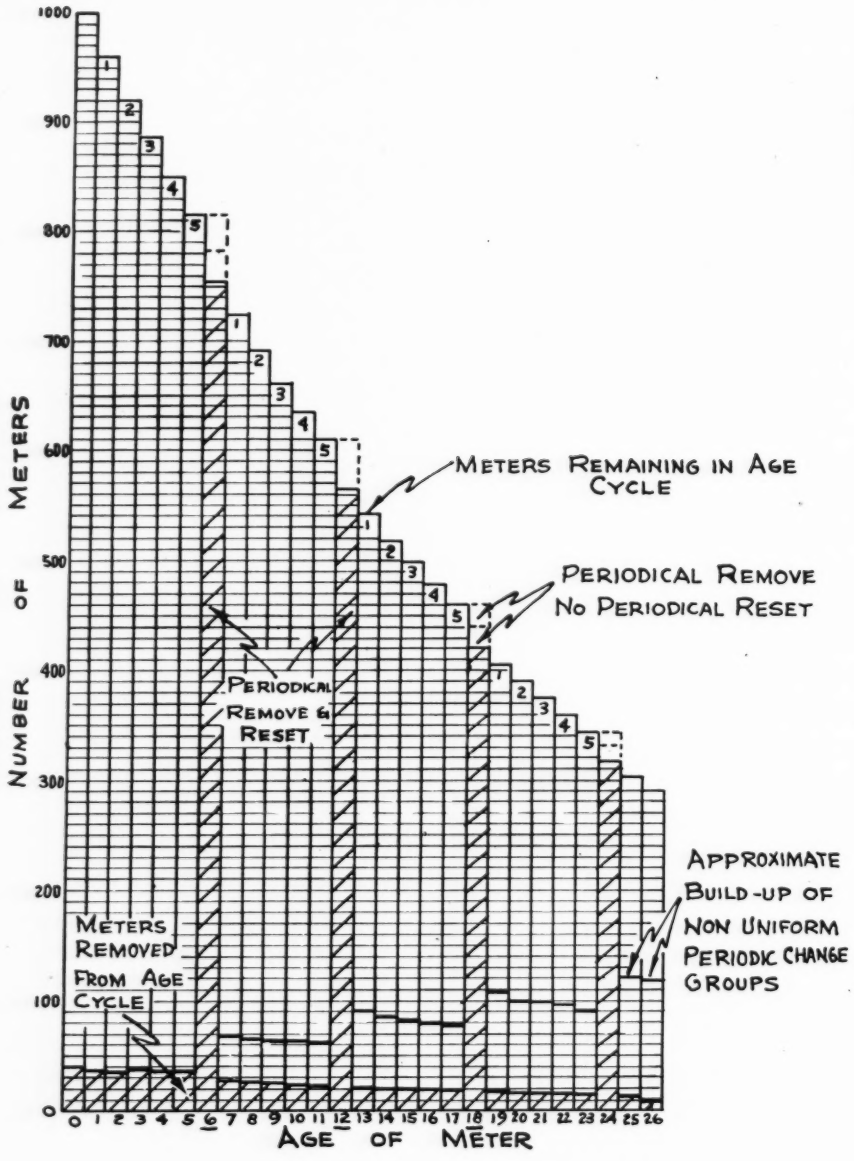

NUMBER OF METERS
METERS REMAINING IN AGE CYCLE
PERIODICAL REMOVE NO PERIODICAL RESET
PERIODICAL REMOVE & RESET
APPROXIMATE BUILD-UP OF NON UNIFORM PERIODIC CHANGE GROUPS
METERS REMOVED FROM AGE CYCLE
AGE OF METER

Fig. 4. Number of meters remaining in a regular periodic change cycle on a 4% yearly "cause" remove basis.

OUR principal source of information is dated repair badges on the meters that go back a period of 15 to 25 years. Meter numbers are indicative of the purchase date. These two items constitute the only information available for a maintenance—meter age study.

Obviously our only answer was to establish a sampling procedure that could be carried out in reasonably short time and to base our maintenance cost picture on these sample statistical findings.

The sampling procedure used was as follows:

1. Segregate meter data into eight 5-year purchase age groups, such as 1925-30, 1930-35, etc.

2. Record repair badges on meters for the past 15-year period on each meter.

3. Record the service years per meter from the date of the oldest badge listed under (2) to date.

The data for the study were recorded in the second half of the year 1949, and consequently for practical purposes it may be said all the data were gathered at one time. With these we could calculate the cost per meter-service-year for the various age groups, for a period from 1949 back that averaged out about 13 years. The cost of the repairs was taken from the table shown previously in *Table 2*.

Fig. 3 is the form used for recording the data.

Why is it necessary to classify meters by a 5-year age group? Why not year-by-year? The reason is that periodic age changes very much affect the nature of repairs in any one year. In most companies "Cause" remove meters are removed from the regular periodic change group at the rate of 3 to 4% yearly. *Fig. 4* shows the number of meters remaining in a regular periodic change cycle on a 4% yearly "Cause" remove basis. In effect the calculations are the same for a 4% compound discount table. *Fig. 4* shows that even after 20-25 years the regular periodic year changes remain a peak in the incidence of removes. Consequently it is necessary to shuffle up the meters of a number of years, such as a five-year age group, to arrive at an unbiased sample of meter service-year costs by meter age.

Selecting Sample Size

How large a sample of each to the several five-year age groups is it necessary to take to produce reliable information? The answer to this question lies in the amount of variation in cost per service year of the meters themselves. On the left hand side of *Fig. 5* is a frequency distribution of 1000 meter service year costs in a number of cost groups varying by 0.30 cents from each other. This distribution is roughly representative of the situation we investigated. To make a calculation for sample size three factors are involved:

1. The standard deviation of the meter service-year costs for the full group of meters (known as the population from which the sample is drawn) about their own average cost. In other words, this is a measure of the spread or variation of the service year costs. This factor is an estimate usually obtained from a number of small sample values.

Metering

meter age studies. This method is an alternative to the other two methods described in last month's installment, and is for use when meter history cards based upon purchase data on the meters are not readily available.

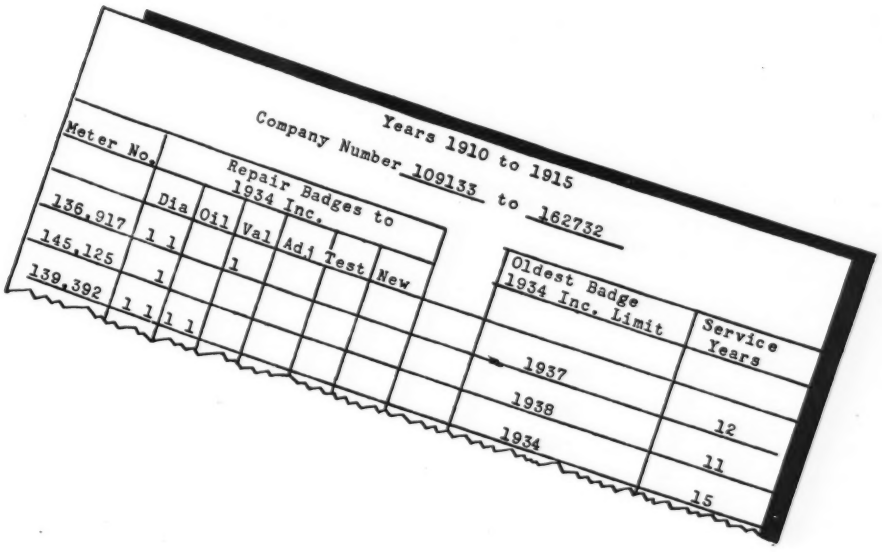


Fig. 3. Form used for recording data used to calculate cost per meter-service year for various age groups.

2. A factor for the amount of probability or reliability we wish to choose for the average cost per service-year we get from the sample. Sampling procedure always contains a risk of error. In the calculation shown the reliability is 99%, risk 1%.

3. The variation in sample average of service-year costs from the true full group or population average, allowable without unduly distorting results.

In *Fig. 5* we see that the necessary sample size was found to be 1180 meters for this situation.

Sampling mathematics are a mystery to many, but to the present generation graduating from our colleges the above procedure will appear familiar.

The results of the sample service-year cost averages are worked out in *Table 4* and plotted in *Fig. 6*. In the figure, the maintenance cost is combined with straight line depreciation cost on a cumulative basis.

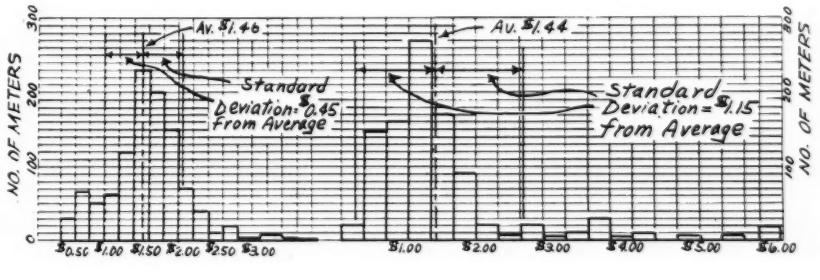
Costs Explained

(It may be noted that the costs plotted represent 13 years past average values. An attempt was made to derive more up-to-date information by only listing information for the last service period since the last repair, a period of about 6½ years past. The variation in cost per meter service-year from the general average turned out to be so great, as shown on the right hand side of *Fig. 5*, that a very large sample is required. Information based on sample of about one-third the size theoretically required is plotted in dotted lines on *Fig. 6*. The pattern is very irregular, and no further use of the information was made.)

Note that even after many years this combined cost of maintenance and depreciation is still falling off. I believe this is a typical situation in that a clear case for meter obsolescence cannot be based only on increased maintenance cost with age. At this point someone might say the analysis is complete, and the longer we keep a meter the more economy we produce. This is far from the truth, as at this point the analysis of how to reduce costs begins.

Program for Lowering Costs

The leading question to be asked is: Why is the maintenance cost curve as high as it is anywhere along the life of the meter? Maintenance cost over the life of a meter is almost directly affected by the number of trips to the repair shop. In some cases more extensive repairs result from a longer stay in service, but this is a comparatively small



Frequency distribution of 1000 meter-service-year costs based on 12.5 years operation

Frequency distribution of 1000 meter-service-year costs based on last repair, approximately 6.5 years of operation

$$\text{Sample size required} = \frac{(\text{Standard deviation})^2 \text{ (of population)} \times (\text{Probability factor})^2}{(\text{Allowable variation of sample average from population average})^2}$$

$$\text{Sample size} = \frac{(\$0.45)^2 \times (2.3)^2}{\$0.03} = 1180 \text{ meters} \qquad \text{Sample size} = \frac{(\$1.15)^2 \times (2.3)^2}{\$0.03} = 7800 \text{ meters}$$

NOTE: The figure 2.3 in each equation is the factor for the amount of probability chosen for the average cost per service-year.

Fig. 5. Sample size determination, illustrating method used to arrive at number of meters it is necessary to sample in order to produce reliable information.

TABLE 4. Gas Meter Age-Maintenance Study (Essex Division)

Age Group Numbers Years & (Av. Age)	Total Meters	Total Repairs	Repairs & Changes Costs					Total Repair Change Costs	Service Years - Total & Per Meter	Maintenance per Service Year	
			Dia. @ $10.30	Oil @ $7.40	Valve @ $5.93	Adj. @ $4.03	Test @ $3.09			Current	Cumulative
19661 to 72695 1900–1905 (47.5)	850	2007	505 5201.50	1029 7614.60	221 1310.53	122 491.66	130 401.70	$15019.99	10724 12.65	$1.40	$1.22
72696 to 109132 1905–1910 (42.5)	1000	2315	740 7622.00	1081 7999.40	243 1440.99	113 455.39	138 426.42	17944.20	12490 12.49	1.44	1.20
109133 to 162732 1910–1915 (37.5)	1000	2382	856 8816.80	1042 7710.80	311 1844.23	62 249.86	111 342.99	18964.68	12976 12.97	1.46	1.16
162733 to 190946 1915–1920 (32.5)	1000	2234	867 8930.10	1044 7725.60	280 1660.40	43 173.29	110 339.90	18829.29	13032 13.03	1.44	1.10
190947 to 242473 1920–1925 (27.5)	1000	2087	809 8332.70	1029 7614.60	192 1138.56	57 229.71	101 312.09	17627.66	12981 12.98	1.36	1.02
242474 to 307422 1925–1930 (22.5)	1000	2023	753 7755.90	884 6541.60	217 1286.81	43 173.29	126 389.34	16146.94	13013 13.03	1.24	.92
307423 to 310611 1930–1935 (17.5)	125	222	47 484.10	122 902.80	26 154.18	6 24.18	21 64.89	1630.15	1586 12.71	1.03	.77
310612 to 336886 1935–1940 (12.5)	650	644	45 463.50	232 1716.80	353 2093.29	14 56.42	59 182.31	4512.32	8039 12.03	.56	.56

item of whole maintenance cost of a number of meters. The predominant factor in maintenance is the arbitrary age change period assigned. Such an age-in-service limitation causes us to pull a new meter out of service in the same way as one 35 years old, although we know that the former can probably stay on twice as long as the latter. This is economic waste.

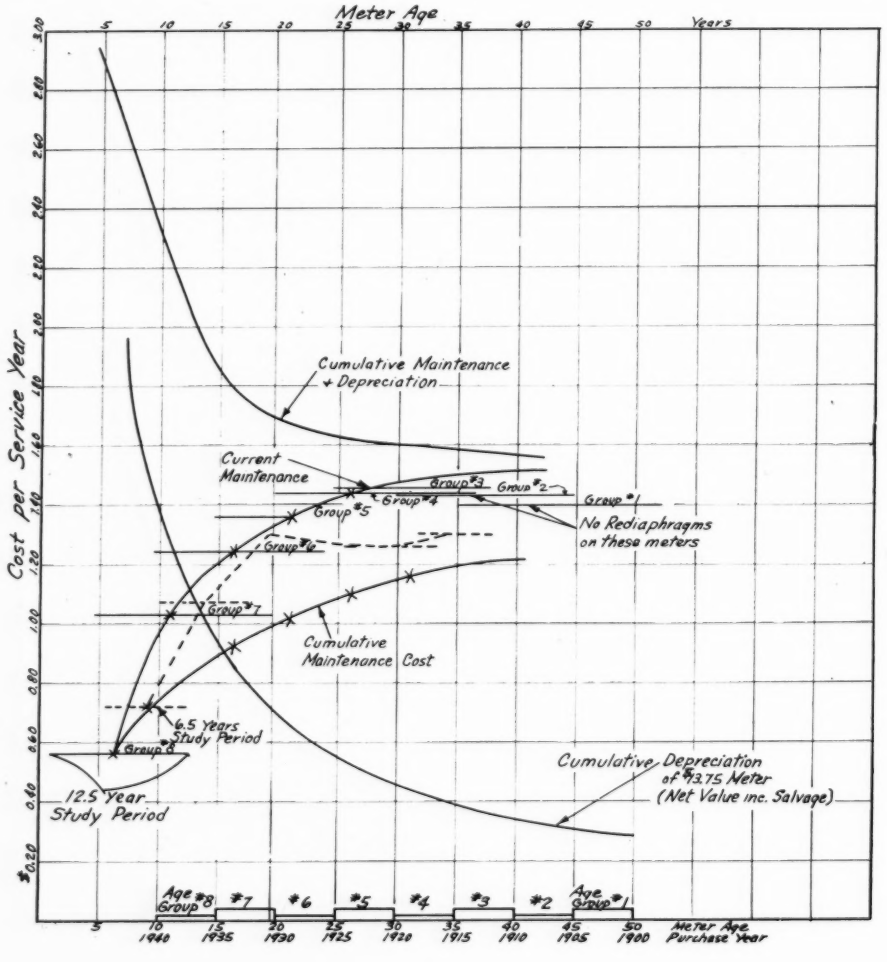


Fig. 6. Results of sample service-year cost averages for Essex division of Public Service Electric & Gas, based on repair records of 6625 meters in eight 5-year period age groups, over an average service period of 12.5 years. Meters removed in fall of 1949.

What governs the age change period? Let us look at *Fig. 7*, where the percentage of commerciallly correct incoming meters (also the relative incidence of DR&DPG meters) is plotted on a meter age basis above the cumulative maintenance and depreciation costs. As the two curves are approximately the same shape it appears that in performance we receive proportionately to what we spend in cumulative meter costs. This is true, but we can change the proportion if we can change the periodic remove time. As long as we have an appreciable percentage of old meters with a poor performance record we certainly will have no case for lengthening the periodic change period.

Extension Desirable

In *Fig. 7* are shown 8-year and 10-year age-change maintenance cost curves computed from the known maintenance cost curve based on a 6-year change period. A simple calculation will show that these are approximately 79% and 65% of 6-year change present costs. Combined maintenance and depreciation under the longer change periods drop below present cumulative cost of a 35-year-old meter on a 6-year change basis at a very much earlier period of meter life.

Therefore extension of the periodic change period is a highly desirable goal. There are three factors that we are watching at Public Service that may help us reach this goal.

1. Improvement in repair procedure.
2. Numerical reduction of the older group of meters by condemnation.
3. Coming of natural gas to the Eastern Seaboard.

By use of the first two factors, while still on a 6-year basis, we must prepare our meters for an 8- or for a 10-year

basis. This involves an additional preparatory expense that must be carried a minimum of six years, until the records of improved meter accuracy become available for preparation of a case for lengthening of the periodic change period. The third factor, natural gas, may allow us to prepare a case without additional preparatory expense, if general rediaphragmming can be avoided. Time will tell the story.

Throwaway Meter

Before closing, reference should be made to another possibility in metering practice—the throwaway meter. Meter obsolescence determination, explained earlier in this paper, is not applicable to the idea of a short life meter (referred to as a "throwaway" meter, because no repairs are ever to be made on it). I have recorded my idea of the correct calculation for the necessary economic life of such a meter, with the idea of provoking thought on the subject.

Determination of minimum permissible life (L_n) a meter which is never repaired may have in order that its replacement may not result in a greater annual cost than the cost when a meter is repaired until the limit of its useability:

Let P_n = Net price of meter (assuming the same construction as at present)

M = Annual maintenance cost per meter.
= Total meter maintenance cost ÷ meters in service.

L_c = Life at condemnation, presently used.
= Meters in service ÷ meters condemned annually.

C = Meter change cost.

A_p = Age change period.

To satisfy the requirement,

$$\frac{P_n + C}{L_n} < M + \frac{C}{A} + \frac{P_n}{L_c}$$

Solving for L_n

$$L_n = \frac{P_n + C}{M + \frac{C}{A} + \frac{P_n}{L_c}}$$

Let us see what value some of these terms could be given in the gas department of our company.

If P = \$13.75 (net cost considering salvage)

M = Total annual maintenance / Meters in Service = \$750,000 / 950,000 = \$0.79

L_c = 950,000 Meters / 30,000 = 31.7 years annual condemns

C = \$2.00 Present change meter cost

A_p = Present legal age change period—6 years

$$L_n = \frac{13.75 - 2.00}{0.79 - \frac{2.00}{6} - \frac{13.75}{31.7}} = 8.4 \text{ years}$$

So, by theory, if it is possible for a meter to last 8.4 years without any attention, it could be replaced at that time without raising meter costs above present ones. Any further life it gives us would be profit. Note that the calculation involves only terms generally known to us. To make such a change profitable in a worthwhile way in our situation, we would have to realize at least 10 to 12 years of life. This we are not assured of at present, although the coming of natural gas to the Eastern Seaboard may soon alter conditions. The subject is worth studying, both from the gas company and manufacturer viewpoint, and men in both industries are doing so. The possibility of a trade-in plan, an old meter for a new one, would reduce the cost if certain parts such as index and axle, screws, etc., could be used over. Also there should be some economies in design and manufacture. Vulnerability of this idea is that the supply of meters might be badly affected by war or other emergency.

SUMMARY

Returning to the general question of meter obsolescence discussed in this paper we may say there are two extremes of reacting to this question. There are those who delight in something new because it is new, even a new shiny gas meter, same as they would be pleased by a new hat. Then there are those who keep a meter until its breathing becomes more and more irregular with age, on the general theory, as someone has expressed it, "make it do, wear it out, eat it up, do without." Neither of these attitudes is of any help in industrial economy.

Our proper goal is to be statistically guided in promoting maximum economy of metering, without at the same time impairing accuracy and reliability in service.

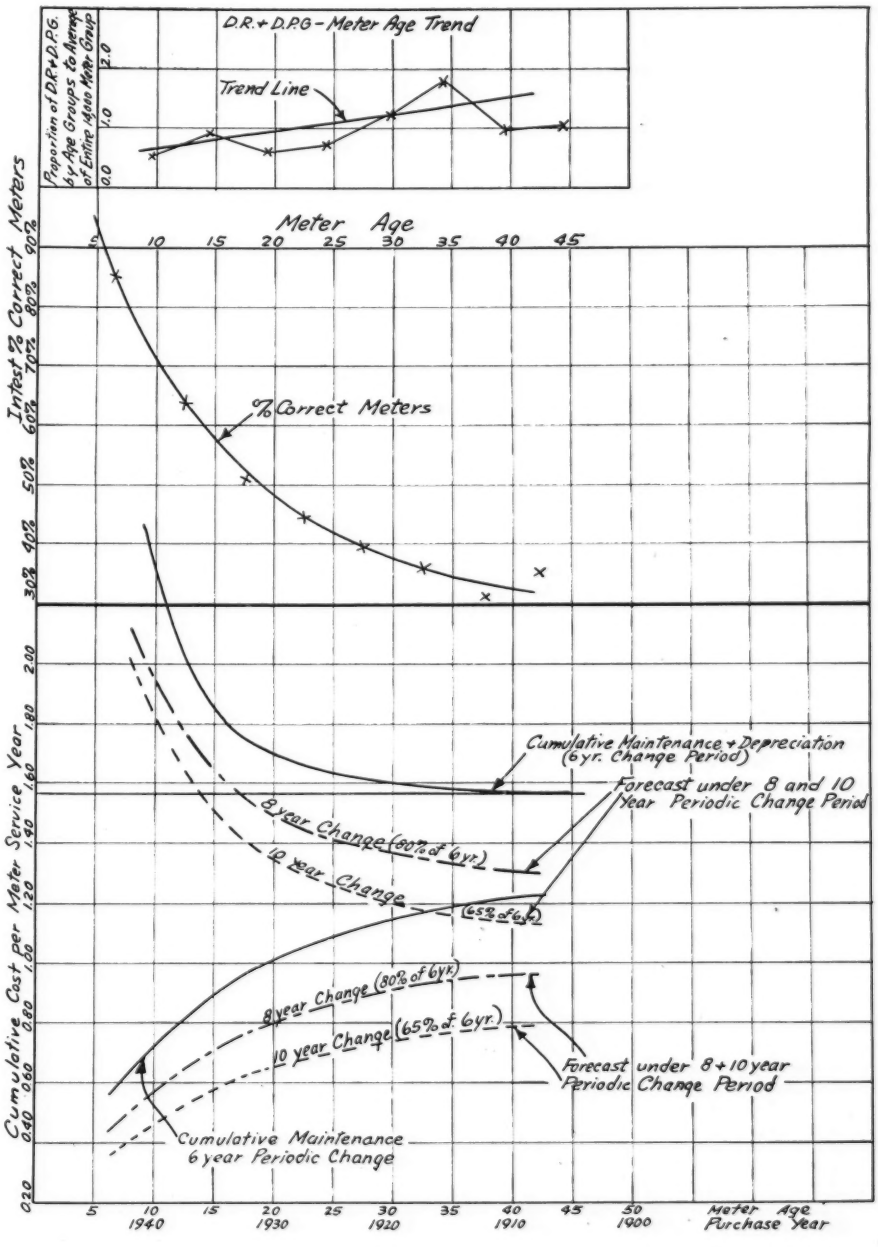

D.R.+D.P.G.-Meter Age Trend
Trend Line
Meter Age
Instant % Correct Meters
% Correct Meters
Cumulative Maintenance + Depreciation (6 yr. Change Period)
Forecast under 8 and 10 Year Periodic Change Period
8 year Change (80% of 6 yr.)
10 year Change (65% of 6 yr.)
Cumulative Maintenance 6 year Periodic Change
Cumulative Cost per Meter Service Year
Meter Age Purchase Year

Fig. 7. Upper curve is based on meter performance-meter age, showing percentage of commercially correct incoming meters. Lower curve represents cumulative maintenance and depreciation costs. Data from studies made in Essex division.

Teaching Gas Utility Employees How To Figo

The author, Pittsburgh Group gas engineer, reviews his company's program for educating personnel in firefighting technique

By WILLIS E. MULDREW

WHETHER war or peace lies ahead, hundreds of men in Pittsburgh Group gas companies are being trained to fight fire. Six firefighting schools have been held in strategic locations throughout the territory of The Manufacturers Light & Heat Co. and its associated companies in the Pittsburgh Group of the Columbia Gas System. The men acquiring firsthand experience in extinguishing propane, natural gas, oil, and gasoline fires are now equipped to pass on their knowledge to others in compressor stations, propane plants, shops, and field crews.

Exclusive

The gas engineering department of Pittsburgh Group companies has been responsible for this training program. Its entrance into this field of activity originated several years ago when propane plants were constructed to aid in meeting peak load requirements.

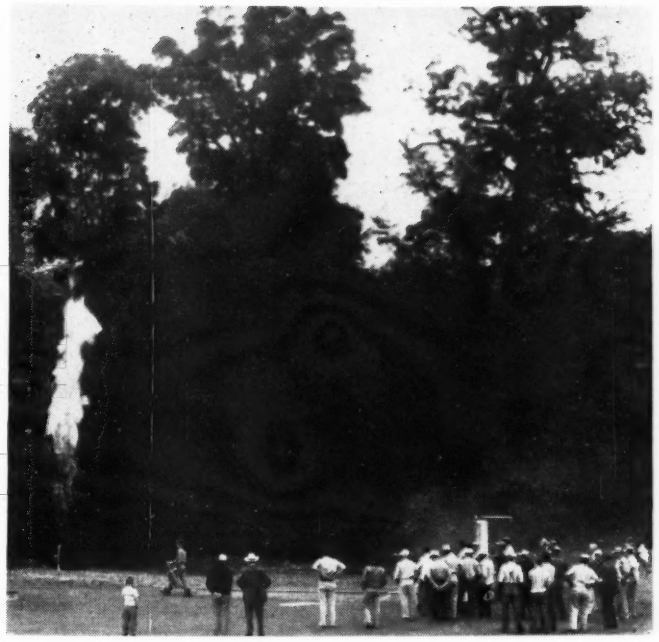
One of the vital components of each propane plant was, and is, an effective method for extinguishing fire. Although the plants were designed according to the best known practices, no one can dispute the potential fire hazard and the desirability of having proper fire fighting equipment.

Experiments were conducted with various types of fire fighting equipment. Extinguishers of many makes were used on purposely set and well-controlled fires. This investigation indicated that the dry chemical type extinguisher was superior to others in killing fires originating from either liquid propane or propane vapor.

After this type of extinguisher became standard equipment in our propane plants, various field superintendents and foremen in production-transmission activities asked for this equipment in their shops and stations.

THE AUTHOR demonstrates the correct way to smother a blaze. Although the dry chemical stream forms a protective, heat-shielding screen, firefighter still feels intense heat of the blaze. Dry chemical used has a sodium bicarbonate base, and is propelled by a carbon dioxide cartridge.

Figopane Fires



TOWERING FIRE at left was made with liquid propane at high pressure. Note gasman approaching it with dry chemical extinguisher. Extinguishing time: a few seconds.

It was, therefore, judged wise to make a special effort not only to refresh the memory of many men on good fire fighting practices, but also to give them a thorough schooling on the use of dry chemical extinguishers.

Pittsburgh Group fire-fighting schools were held in July, August, and early September at the group's Ellwood City, Dundee, Claysville, Porter's Falls and Rider compressor stations. The scope of training was identical at each location, but two classes were held at Ellwood City for different groups.

Arrangements were made with superintendents of operating departments to send key personnel to the school nearest normal work location. Students included propane plant operators, compressor station employees, transmission and production divisional superintendents, and foremen, plus gas distribution department district and local managers. Representatives of fire departments in cities and towns near each school were also invited to attend the one-day session.

Demonstration Plan

A setup was made at each compressor station on the day preceding the school. Arrangements were made to have a tank truck of propane available at those stations where the group companies did not have propane storage tanks. Pits and ditches were dug on a far corner of a compressor station lawn, and natural gas piping laid above ground to the demonstration area.

As each group of about 25 men met on the morning of the designated day, they were told that the fires to be set were created to simulate as closely as possible the hazard of a broken pipe, loose flange, spilled liquid, and the like.

Each man present at the school was to extinguish each type of fire.

The first blaze came from the open end of a 2-in. natural gas line. Gas was coming through the line at about 150-lb pressure.

To simulate the condition of an underground broken pipe, about 10 ft of 2-in. line was laid in a ditch. One-half-inch holes were drilled every 18 in. along this pipe, which was covered with 15 in. of rock and earth. Gas was turned on and ignited by a torch. One by one the gas men approached the fire which repeatedly rose 10 or more feet from the ground. Again and again in a matter of seconds, the blaze was extinguished.

A liquid propane fire was demonstrated by having a ¼-in. hole drilled into the cap on a 2-in. line that extended up about 4 ft from ground level. Despite 115 lb of pressure behind this propane blaze, it too was successfully extinguished by each man.

What might happen when the packing blows out of a valve was next demonstrated. A cap having four ¼-in. holes was placed on the pipeline. The blaze, resulting from liquid propane squirting out of these holes, towered over the tops of nearby trees.

Another demonstration of a propane fire utilized a bolted flange on the pipeline with a 1-in. section of the gasket removed. This represented the potential situation when a gasket becomes defective.

Liquid Propane

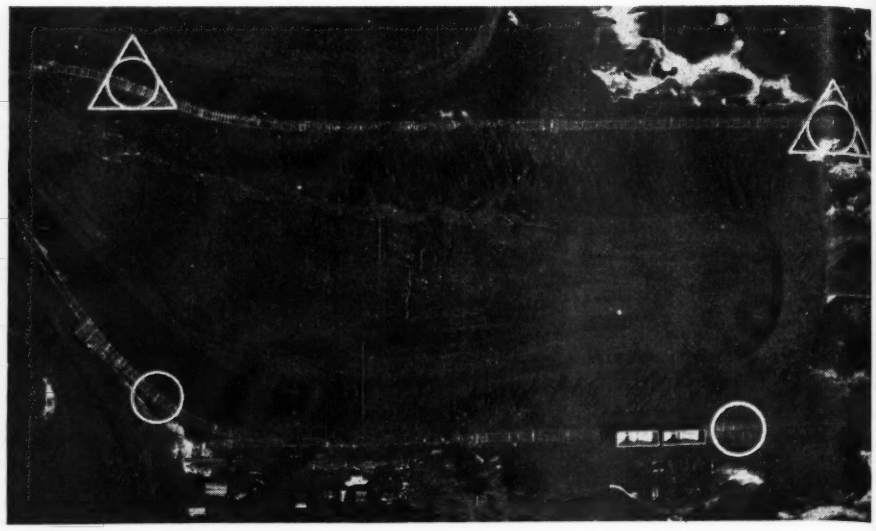
One of the largest fires at each school was created when liquid propane was introduced at 115-lb pressure into the pipe which had a ½-in. hole in the cap. This blaze usually attracted the unexpected audience of freight train engineers, passing motorists and farmers from neighboring hillsides. But it, too, was promptly smothered over and over again as each student took his turn.

The pan-type fire was demonstrated by pouring 10 gal. of oil and 5 gal. of gasoline into a 25-sq ft pan which contained about 5 in. of water. As the long-handled torch set this mixture ablaze, a roaring fire and thick black smoke was instantly created. Approaching the blaze, "with the wind," the production, transmission and distribution men swept the extinguisher nozzle back and forth across the blazing tank to quickly stop the fire.

Smothering Chemical

The extinguisher used by the Pittsburgh Group men was a unit which contained 30 lb of a dry chemical that has a sodium bicarbonate base, treated to make it water-repellent. The powder is pulverized to the extent that 80% of it can pass through a 325-mesh screen. The propellent is 8½ oz. of carbon dioxide in a cartridge. Expelled with great force from the nozzle of the extinguisher, the sodium bicarbonate in striking the flame increases its volume more than 1000 times, and is transformed into carbon dioxide and water vapor. A smothering action takes place.

In addition to training Manufacturers Light & Heat men, and men of the associated companies, the gas engineering department also has accepted invitations to assist outside agencies. Within the last year, demonstrations in fighting propane, natural gas, and gasoline fires with a dry chemical were given in Wheeling, W. Va., and Martins Ferry, Ohio. This specific part of three-day schooling in all aspects of fire-fighting was conducted by gas company personnel at the request of the Wheeling fire department and the Industrial Fire bureau of the Ohio valley.



GROUND CONTROL is established for each stockpile—two horizontal points (represented in photo by circles) and two vertical points (represented by circles and by triangle-circle combination). From overlapping (stereo) pairs of aerial photos such as this, contours of stockpile are traced with precise stereoplotting instruments. This photo is of Philadelphia Electric Co.'s Petty's Island coal stockpile.

Taking A Coal Inventory— With Aerial Photographs

PHILADELPHIA Electric Co. this year took stock of its fuel on hand through the use of a new aerial mapping method. This new system of taking inventory from the air proved accurate within 3 to 5%, and provided the inventory figures in a matter of days instead of weeks. The air survey cut the inventory costs by 25%.

The company's total coal stock is more than 500,000 tons, which is stored in 10 different locations. Some of the stockpiles are as large as 85,000 tons.

Philadelphia Electric knew that aerial mapping had been used successfully for reservoir studies, for transmission line surveys, and for distribution maps. Why not use it to check coal stocks?

Accordingly, the utility asked Areo Service Corp. of Philadelphia to look at costs and time schedules. It was determined a pair of aerial photos would provide the coverage needed for each site, and that the necessary photo-flights could be executed in a few hours.

Ground control required four elevation points and two horizontal points for each location. Compilation of the topographic maps with precise optical machines would require a week or 10 days after photography and field control were completed.

After careful consideration of aerial inventory, the company gave the green light to the project, and the photo-flight was scheduled for the next clear mapping day. On the day of the flight, the utility's personnel was notified to be on watch for the survey plane, so that the exact time the inventory photos were made could be recorded, an important factor in later computations. The plane flew over at an altitude of 1200 ft.

Each 9 x 9-in. aerial view covered approximately 75 acres. They were photographed as overlapping stereo-pairs, which enabled mapping compilers to trace the contours for each stockpile with the aid of a special stereo-plotting machine. In this way, a three-dimensional view of the terrain is obtained, and the contour at each height plotted.

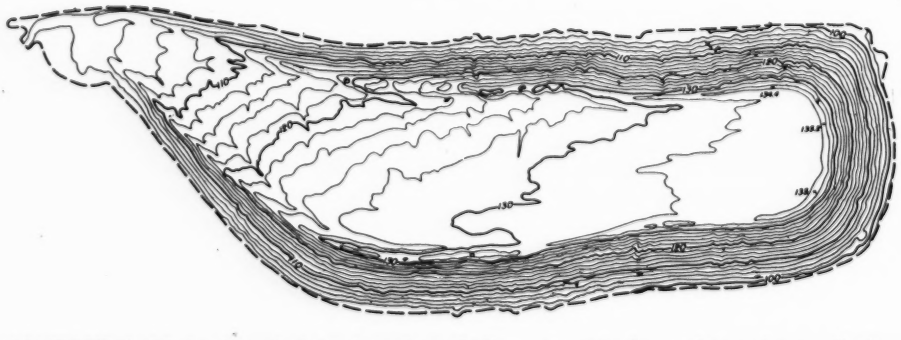
After this plotting is completed, the area for each contour is measured with a polar planimeter. With these data the cubic volume for each "layer" or segment of the pile can be computed. The total volume is the sum of these layers. Since computation is made from peak to base in sequence, it is self-correcting, and the total possible error for each pile is within 3 to 5%.

The aerial photos, contour maps, and the results of the computations for each stockpile were delivered to Philadelphia Electric Co. To establish the tonnage for each pile, the company determined the unit weight of the coal by sampling.

Costs for this work vary according to the size of the areas to be mapped, locations, airport facilities, scheduling, and other factors. Even when mapping only a few stockpiles, some savings will be possible. The mappers also point out that speed and accuracy are always an advantage of aerial inventories. Moreover, air surveys also release engineering manhours for other essential work.

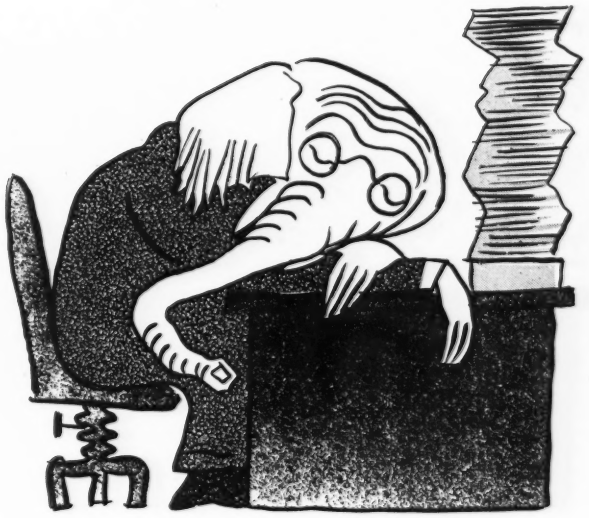
According to Aero Service engineers, aerial mapping could be used to tally ore stockpiles or to inventory spoil banks, should re-working be planned. It has been used to tally the amounts removed from open pit mines, and an air survey of a "stockpile" of logs is now in progress.

In the mapping of large areas for industrial development—highways, city planning, pipelines, and other uses—the marked economy and accuracy of aerial mapping prompt use of this tool.



CONTOUR MAP for Petty's Island coal stockpile was made from photo above. Each "layer" area is computed with a polar planimeter, and total of "layers" is volume of pile. This pile: 2,576,889 cu ft.

Are Greybeards White Elephants?



. . . OR ARE THEY a potential source of great wealth that we've been deliberately and recklessly disregarding?

Is "retirement" a state of comfort, security, and luxurious living, or is it a time of insecurity, decay, and poverty? At age 65 do we automatically become a burden on our employer, if we continue working, or do we still have left in us some useful, economically productive years?

These questions have not been settled by our arbitrarily administered retirement plans, says Dr. Wittmer. We've been dodging a problem that is growing in intensity every day.

Pension systems as presently operated are fair neither to the individual nor to society. The average wage earner at 65 is making but $808 per year, has savings of only $200. In such situations his support, whether provided by his children, government benefits, or private pension funds, is inadequate. Progressive decentralization of families and smaller homes have made the cost of keeping oldsters much higher than ever before.

The support of our "senior citizens" has, in the past century, shifted from a private problem to a public one. And it has come on with a rush. A hundred years ago we were a young nation with a high birth rate and a low life expectancy. As late as 1900, the birth rate was 30 per 1000; today it is 20—and still dropping. Life expectancy was 49.7 years; now it is 66.7. Today one out of every 12 people is 65 or over. In 1975 it may well be 1 in 9. Every day, now, 2700 people become 65; every day in 1975 4200 will pass the milestone.

Of the more than 10 million persons over 65 now living in the United States, only 37% are employed or wed to employed persons.

The problem is one which all industry must face up to. Larger industries, such as gas utilities, have an unusual stake in it, and since by their nature they attract a large percentage of security-minded employees, they have a role to play in finding the solution.

Dr. Wittmer, vice president of Consolidated Edison Co. of New York, has at least a partial solution which he develops in this abridged version of a paper presented at the AGA convention in Atlantic City last October.

By Dr. John J. Wittmer

INDUSTRY has been grossly guilty of banishing into retirement men still capable of worthwhile economic productivity. We have discarded skill and energy which could very well be utilized in the national economy and we have crushed the morale and will-to-live of a large portion of our population. Society generally has forced our aged citizens into the degrading position of feeling they are parasites on society.

An eminent psychologist has said, "The word 'retirement' conveys too often the impression of luxurious living, of ease, and comfort and security. Usually, it is quite the contrary—a time of insecurity, decay, and poverty."

In addition to the lack of financial security, retirement to the average pensioner comes as a great psychological shock. He feels unwanted and useless and very much on the outer fringe of life. Dr. Roger I. Lee, former president of the American Medical Assn., has said, "Death comes at retirement. The more intelligent pensioners rebel when they are retired and lead a miserable existence that cuts short their life span."

Are we going to be found guilty then of sending men to a life of anxiety, misery, and death as a reward for past service? I hope not.

We've adopted 65 as our retirement age generally throughout industry, but is this a realistic approach? Geriatricians, doctors who specialize in the diseases of the aged, say that a man's chronological age is no more necessarily an indication of his capabilities than is the presence of hair on his head. A man may have a chronological age of 65 and have a physiological age of 50 and a psychological age of 40. Such a man could in no way be considered too old to work and yet such a man would be forced into idleness under a compulsory retirement plan.

Industrial surveys have shown us that older men have fewer accidents than younger men, have fewer absences, are generally more loyal and are very often more skilled and better producers than the younger workers.

A survey made recently by the Bureau of Labor Statistics shows us that absenteeism of workers 65 to 69 is only 3.3 days per 100, whereas the rate for workers 25 to 29 years old is 4.3 days per 100. As to non-disabling injuries per million work hours, the workers 25 to 29 have a rate of 1560 injuries as compared to only 430 for men over 65. These figures would tend to show us that whatever older workers lose in speed and strength, they compensate for with skill and endurance.

And we cannot, by any means, ignore the fact that men over 65, to a great extent, are the leading figures in the world of business, politics, and science. *Poor's Directory* tells that 28% of America's top business executives are over 65 years of age. Over 40% of U. S. senators are 65 years of age or older. Men such as Bernard Baruch, Herbert Hoover, and Gen. Douglas MacArthur are past 65 and yet are great leaders of thought and sound administrators.

How can we admit the ability of men over 65 to direct businesses, nations, and armies and still hold to the notion that a man of 65 is too old to do simple clerical or mechanical work? It seems terribly incongruous.

Let's turn next to management's stake in the age picture.

As the average age of our employees increases, our pension costs will rise. At present, they are computed at 6 to 8% of a company's operating expenses.

A rise, such as I've described, in the percentage of persons 65 years of age will double or triple these pension expenses. In addition to this direct rise in costs, there will also be the cost of management's contributions to increased government Social Security spending. In return for these expenditures we will receive nothing in the way of production. We will greatly add to our overhead without increasing productivity. A very costly proposition, and very poor economics.

By retiring men arbitrarily at 65, we are in many cases discarding skill and experience which we could very well use. We are paying men to be idle. And we are forcing capable men into an unwanted idleness which in some cases tragically shortens their lives.

At Consolidated Edison we sent out a questionnaire to our recently retired employees and of 250 persons answering the question, "Were you glad to retire?" 147 answered, "No, I was not."

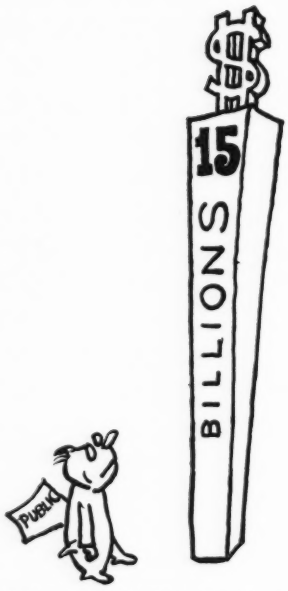
Why should industry foolishly *continue* sending men who are still potentially useful workers into an unwanted and expensive retirement?

This, of course, does not mean that industries should become old people's homes. *Only workers* who can make a worth while contribution should be given the opportunity to work past retirement age, and they should *only* be retained as long as they are pulling their weight.

It certainly does not mean that a man must be kept at a job he is not capable of performing. However, management may find it very advisable and worthwhile to place a man who wishes to work past retirement age, and is physically capable of doing so in a less taxing job than the one he held, at a reduced rate of pay commensurate with his new duties. In this way the employee would have the satisfaction of earning his way, of making a worthwhile contribution, and would still prove no economic burden to industry.

In considering the older worker, we must aways recognize the fact that the more non-productive members of society we have, the greater the burden on the economy will become. As Herbert Hoover has put it, "We have less than 70 million providers in the group of persons aged 20 to 65 and they must provide for 80 million non-productives among the children, aged, sick, and government workers and their wives. It is solely from the energies of this middle group, their inventions, and their productivity that can come the support of the young, the old, and the sick—and the government workers."

The estimated cost of supporting the nation's unemployed in 1975 has been set at $15 billion. This could represent a very serious drain on the economy,



COST OF SUPPORTING THE NATION'S UNEMPLOYED IN 1975

and any steps which we can take toward keeping a sizeable proportion of the aged productively employed will help immeasurably to lighten this burden. We must help to keep the aged out of the non-productive group and among the producers. We must keep them among the drivers rather than among the riders—for the good of all.

Here are two possible solutions which should warrant your earnest consideration. Perhaps these tentative plans will help guide your thinking toward a solution.

One proposal would involve, primarily, the establishment of a permanent retirement panel to consider each employee reaching retirement age on an individual basis. Let me emphasize those words "on an individual basis." This is the key to the new approach toward retirement which we recognize as having considerable merit, and at the same time presenting some administrative difficulties which we have not faced heretofore.

Each man reaching retirement age must be considered as a special and individual case. His capabilities, his service record, his physical status, his productive capacity and his value to the company must be the only determinants in any procedure relating to him. He must not be pushed into a group category subject to a mass decision. Our companies are only as strong as the individuals which comprise them, and we must never obliterate the individual's identity by substituting a group identity. Each man should be made to stand or fall on his own unique qualifications and abilities. No other method of determination can be equitable or realistic.

The "retirement panel," as it is envisioned, should be composed of an executive representing the physical employee groups, an executive representing the non-physical employee groups, and an executive representing industrial relations activities.

The men on this panel should be no older than 55 years of age and should be men who will not bow to pressure from any direction. That pressure will be exerted from any one of several directions in certain cases, to retain incompetents on the payrolls, is recognized but must be utterly disregarded by the panel. They must be capable of viewing each employee's case objectively and of rendering a decision which is fair to both employee and employer. The choice of these panel members may very well provide the key to whether this entire plan will be a success or a failure.

The job of this panel would be to make one of three decisions, and the panel's decisions should be final in every case:

1. Either it would continue a man at his present job, providing, of course that he woud be judged completely competent to handle this job, and assuming there was a continuing need for the performance of the job, or 2. If the employee were judged to be not able to handle his present job, the panel would offer, and I emphasize *offer*, the man a lower rated *available* job which he *could* handle, or 3. It would retire at 65 the man not competent enough to do any available job effectively.

Decisions on each case should be based on a complete report on the employee's health made by the company's medical department, and on an efficiency report submitted by the worker's department head. These reports should be submitted to the panel in writing.

This does not, of course, mean that the panel would force a man to work past 65, or that a man must accept the panel's job offer; or that if once such a job offer is accepted, the man cannot subsequently retire.

There should be no desire to chain a man to his desk if he wishes to retire. In such an instance, the worker's case would not go to the panel for consideration; he would merely be retired according to the conventional retirement procedure. If a man declares prior to the panel's meeting that he would like to continue working, but then finds the panel's job offer unsatisfactory, he should be retired. If a man accepts the panel's job recommendation and continues working past his normal retirement date, he should then be permitted to retire at any time, after a month's notice.

So that the decision as to whether he wishes to retire or stay need not be made

hastily, and so that the panel's decision on his case does not come as a sudden jolt to the worker, it is suggested that retirement processing should begin two years prior to age 65. At this time, the employee would be given an estimate of the pension payments he might reasonably expect at retirement and his wishes as to whether he would like to continue working past 65 would be tentatively determined. (See illustration.)

At this time also comprehensive medical and efficiency reports concerning the employee should be prepared and filed with the panel. These reports should be sufficiently complete to tell the whole story on the employee as of that date.

Being a doctor myself, I must grudgingly admit that, in many cases, the physician's report on a man's health cannot be the only deciding factor in determining whether he will be capable of competently continuing in a job. We doctors can, of course, tell you if a man's heart is bad, or if his lungs are weak, or if his overall physical condition is dangerously rundown, but we are not able, with our stethoscopes and thermometers, to measure such factors as approaching senility, lack of interest in work, or inability to make decisions quickly and efficiently. For these important criteria in making a decision to continue a man's work span we must lean heavily on the efficiency report prepared by the employee's department head.

This efficiency report must be made honestly and objectively. Neither friendship nor office politics must be allowed to creep into it. If any employee's performance is called satisfactory when it actually isn't, because of fear of pressure from any direction, the company's best interests would be adversely prejudiced. Conversely, no employee, if qualified, should be discriminately kept from continuing at work because of petty personal reasons.

It would be up to the department head to see that each man gets a fair shake and nothing more. Department managers must be made to realize the importance of their responsibility under this plan, and must be held directly responsible for presenting a fair, comprehensive report. Is this possible? I don't know.

One year prior to the employee's 65th birthday these reports should be brought up to date and again submitted to the panel, and the panel would make its final decision three to six months prior to the employee's scheduled retirement date and advise him as to the disposition of his case.

Suppose such a panel determined that a man could continue working but not at his present job; what may be done then? The man may be offered an available job which he *can* handle, a job which normally will pay less than his previous postion but which will still provide the economic security and feeling of "belonging" which he desires. These jobs can be provided by making a survey of all your job classifications and setting aside those jobs which older men are capable of doing. As the present younger incumbents of these jobs leave them, they should be replaced by the older men. Or as these jobs are needed for older men, the younger workers should be transferred to jobs where their strength and speed could be utilized without loss to the company.

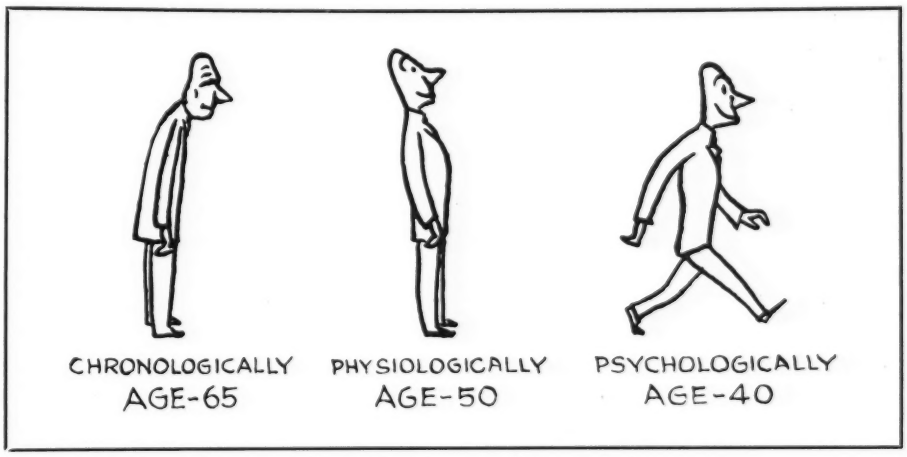
I see nothing unreasonable in the idea that, inasmuch as a man's salary goes up as his value to his company increases, it may also go down as his contribution decreases. I feel that it is much better for both the individual and his company to continue a man at a reduced salary in a job he can handle than to cut him off abruptly at 65. No matter what his pension, it would still be markedly less than his present pay. None of us can reasonably expect "something for nothing" and so a reduced salary for reduced job responsibility at a time when there is decreased personal and family responsibility should come neither as a rebuke nor an insult to any of us, especially since the choice of accepting the panel's offer of a reduced job title at reduced pay is a purely voluntary one on the worker's part.

I should mention here that such a panel should in each case approve continued employment for only one year at a time. In each case of a man who has been continued for one year, there should be a redetermination by the panel, as previously outlined, before he would be approved for another year. In setting up a panel of this kind, one must realize that the union leaders will shortly insist that they have a representative on this panel. I leave it to you, each in your own particular organization, whether this would be an advantage or a disadvantage.

In conjunction with the panel to choose those employees capable of continuing to work past age 65, there should also be instituted a program of counselling to acquaint the older workers with the additional problems advanced age will present them. We must help them to recognize and evaluate their financial problems, we must acquaint them with the physical and mental adjustments they must make to remain healthy, and we must encourage their interest in recreation and leisure-time activities. Such counselling is currently being carried on by many firms throughout the country and should prove of value both to the man who retires at 65 and the man who is enabled to continue in his job. All those who continue in industry past normal retirement age will not continue to work until they die, and so, eventually, will face some years of coping with problems similar to those faced by their fellow workers who retire at 65.

Just as we educate our children to solve the new problems they will encounter in maturity, we must educate our employees to meet the problems presented by old age.

I also feel that it might be a good idea, when asking an employee to make his choice of retiring or continuing at work, to invite the man's wife to the office and talk the entire problem over with the man and his wife. We have done this at Consolidated Edison in such retirement cases and have found that it helps to avoid some of the problems which occasionally crop up because of lack of understanding of all the details of retirement by a worker's spouse. Inasmuch as both man and wife are directly affected by such a decision, we feel it is only fair that the wife be given full particulars on the situation by a company representative and be allowed to express her views on the question.



EMPLOYEE EVALUATION SHEET: TO BE FILLED OUT BY DEPARTMENT HEAD

Employee's Name_____ Date_____

Title_____ Date of 65th Birthday_____

1. Employee's efficiency rating for the past 5 years:_____

2. Record of time lost by employee in past 5 years (excluding vacations):

Years Previous	Sickness No of Absences	No. of Days Lost	Days Lost for Other Reasons (Including Compensable Accidents)
1950			1950
1949			1949
1948			1948
1947			1947
1946			1946

3. Is the job this man is doing a necessary part of the Company's activities?____

4. Is this employee working in his title, i.e. is he fulfilling the duties of his job title? Yes No

5. Are there any functions covered by his title that this employee is not able to carry out satisfactorily? If so, please explain fully:

6. How do you rate this employee's overall effectiveness in his job? A. B. C.

A. Completely satisfactory - a real asset to the department
B. Satisfactory - he is doing a fair day's work
C. Unsatisfactory - he is not able to do a fair day's work in this title.

7. If you checked "A" or "B" in answer to question 6, would you recommend that this employee be retained in his present title for one year, after age 65, if his present efficiency continues? Yes No If "No", Why?_____

8. If you checked "C", how long has this condition existed?_____

9. Are there any other jobs in the Company in which you feel this employee could do a satisfactory day's work?_____. List all titles to which employee might be considered for transfer_____

10. Do you recommend a transfer to such other work for this employee as soon as it might be arranged? Yes No

11. Do you recommend a review of this employee's record for possible retirement prior to age 65? Yes No

SAMPLE FORM which would help determine employee's fitness for work past 65.

The second proposal is in actuality a modification of the plan which I have just outlined and in fact would carry with it some of the same considerations. We recognize that the great majority of our companies have a "normal" or compulsory retirement age established at 65. Some few organizations have taken the step already by extending this "normal" retirement age to 68. This or some higher age level might be set universally, but I feel that some mechanism should be added to provide selectivity in order that we aren't required to retain on our rolls those people who have become physically or otherwise incompetent.

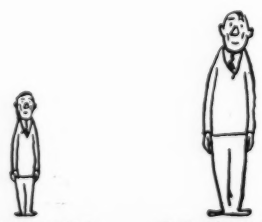
This might be done by having the records, both medical and performance, of all employees reviewed starting at age 63, and each year thereafter up to the increased retirement age. A "disability panel" similar to that which we now have in operation at Consolidated Edison can pick up this responsibility. In explanation, our disability panel now reviews the case of an employee upon the recommendation of his department head or of the medical department. This panel consists of the medical director, the personnel director, and the department head concerned. It meets weekly, and has at its disposal the necessary medical and performance records of the individual. I won't go into further detail regarding the current operation of this disability panel, as it was fully explained in a report sent out to all gas companies by the AGA Personnel committee in May 1950.

Over the past few years we have retired for disability prior to age 65 through the operation of this panel approximately 40% of the total number of employees retired for age and disability. Most of the retirements for disability have been justified on the basis of medical examination and prognosis. There have been however, a number of cases where in the absence of medical justification, the retirement for disability has been made as a result of conclusive demonstration by the employee's department that his effectiveness had sufficiently deteriorated to indicate approaching senility. With a higher normal retirement age we can expect a higher frequency of such cases. Therefore, without such a panel to exercise control, the company's interests, and not infrequently the employee's would be jeopardized by simply raising the retirement age.

Up to this point, we have been primarily concerned with our manual workers, production men, and white collar workers, because they comprise the greater portion of employees in our companies. Now you may be asking yourself, "How would this plan affect our supervisory and executive employees?"

Admitting that there are exceptional men of advanced age active in the ranks of management, we must also truthfully admit that we are not *all* exceptional men. We must admit that as many of us grow older our ability to make decisions rapidly and decisively begins to weaken; that our ability to adjust to new procedures and concepts becomes atrophied; that we are often guilty of camouflaging our decreased executive ability behind bombast and eccentricity; and that many men are holding titles today on the basis of past accomplishments. You can probably name several men in your own organizations guilty of these faults who are being carried in executive positions merely on the basis of remembered glory.

We must face the fact that the ability to organize and make valid decisions is one of the first to go with approaching old age. Executive ability is a special, above-normal attribute possessed by few, and as such, it is lost more quickly in age than the abilities necessary to do routine clerical or mechanical work. Therefore, if we do not adopt a realistic attitude toward retirement of our supervisory and executive staffs we will burden our organizations with dead wood at the policy-making levels, where we can't afford it.



EVERY DAY IN 1950
2700 PERSONS BECAME
65 YEARS OF AGE

EVERY DAY IN 1975
4200 PERSONS WILL BECOME
65 YEARS OF AGE

Men of the executive and supervisory levels do not usually face, at retirement age, the financial and psychological problems which face working class employees. Most of our executives and supervisors will have acquired over the years the wherewithal to provide considerably better than "subsistence level" maintenance in retirement in the form of savings or personal insurance pension annuities. In addition, they ordinarily have enough diversified social and cultural interests to occupy their time creatively. Community, church and charitable groups have always had a great need for men possessing administrative ability and experience to serve in voluntary executive capacities. Such positions will provide our executives with excellent opportunities to utilize their special skills.

Executives and supervisors should, for the most part therefore, be retired at age 65. We should not weaken our companies by retaining such men after their administrative abilities begin to decline. Only the very exceptional executive should be retained past retirement age, so that our companies may be kept at peak efficiency in the policy-making branches and so that openings will be made available at the top to provide daylight toward which the able and ambitious younger men in our companies may climb. If our companies are to grow and prosper, we must always encourage our younger men to strive upward, lest we lose our younger men to other industries.

We have painted our age picture with the somber greys and blacks of a problem and with the bright greens and yellows of a proposed solution. What is the total effect we have produced on our canvas? Have we painted a happy picture or a gloomy one?

If your company and my company and the other major industrial organizations in the nation should adopt either plan I've outlined or some other plan to keep these men working, what will the total effect on the age problem be? If we can reduce the number of people sliding into idleness each day because of age from 2700 to 1500 or 1000, what will we accomplish for the economy?

First of all, I think we will reduce the pool of aged dependents in the nation. Second, we will increase our national productive force and our total productivity. Third, we will raise real wages and establish a new group of consumers. And fourth, we will drastically reduce the costs to industry of pension payments and Social Security expenditures.

Clothes Dryers:

They May Provide the Impetus For Increased Creative Selling

By GERALD ELDRIDGE STEDMAN

CAN the American housewife be made to want an automatic clothes dryer? As yet, the clothes dryer is a product still in its pioneering marketing phase. It has low saturation in most localities. Where does it rank among all other desires in her "elective preference"?

Exclusive

Obviously, the homemaker must be educated to want it. The clothes dryer is a product "which has to be sold." As of today, the average housewife is unacquainted with it and uninformed about it. She continues to go about one of her most annoying household tasks the hard way because of this ignorance.

The need for all other major products in the whiteware field has been pretty well established and accepted—the homemaker knows she needs a refrigerator, range, water heater, washer. She doesn't know, yet, that she needs a clothes dryer. This is a salesman's creative selling job. Has it enough appeal so he can expect to go down the residential street and awaken enough desire to close enough sales to make that customer education profitable? Very definitely, I will say "yes."

The Market: Replacement

The automatic clothes dryer, now so excellently developed in a functional manner, can provide the spark for renewed enthusiasm toward creative selling.

The whiteware market situation presently is somewhat discouraging to the specialty salesman. Needs have been sold. People own. The opportunity is largely replacement. Markets are stabilized. The technique is to promote and merchandise to attract traffic in to buy. The ratio of sales to calls is too low to encourage much outside, creative, specialty selling by new salesmen. Thus, it is hard for the dealer to get salesmen, except those who perform on the floor, and it is harder to maintain them selling outside. Turnover is tough.

There are presently only four new household products in the creative selling category: television, dishwasher, clothes dryer, incinerator; only two are gas-fired. Incinerators are such a sheer utility that their rank on the "elective preference" scale is low; they aren't easy to sell.

Dealers Fall Down

At least that was how I figured it when I started searching for that spark, so much needed by the gas industry—particularly.

Why by the gas industry? Because the product range of gas appliances, compared to major and minor electric appliances, is so low as not to encourage a dealer to sell them exclusively. However, as a combination dealer, he throws his interest to the electric side; dealers are not doing a good gas appliance selling job creatively as is proved by the lowering unit volume ratios comparatively in gas refrigerators, ranges, and water heaters. The gas utilities, recognizing this, have returned to aggressive direct merchandising because, with the favorable advent of natural gas into so many new communities, they have ample, full supplies which they would like to market in greater percentage, more profitably, at base load rates. No one is doing a more energetic and effective selling job than are gas utilities now, and because of their fine community standing, they not only can attract salesmen but provide them confident identification in outside selling, one of the most important essentials, door-to-door. Clothes dryers also develop a very attractive load factor.

The Answer

It seemed apparent, therefore, not only to provide the spark for dealer gas appliance selling, but as well, to deliver new verve to gas utility creative selling, since before now they have not for a long while had any new product answering a new need worthy of creative, educational selling . . . automatic clothes dryers were the answer. I determined to investigate.

During a national tour I made in 1949-50, I invested enough time in each of 10 cities to determine by door-to-door interview of homemakers the answer. I started out with, "Can the American housewife be made to want an automatic clothes dryer?" I conducted interviews in these 10 cities: Seattle, Santa Barbara, Phoenix, Houston, Philadelphia, Boston, Pittsburgh, Cleveland, Nashville, Knoxville. In each, I kept at it until I had developed 20 satisfactory interviews.

Interview Basis

I haven't space herein to discuss mechanics other than to say I selected good residential areas. Of the interviews, 56% were arranged by telephoning from the hotel the night before the call. Ratio here was 1.8 calls per appointment. unusually high. Trouble with this technique is you cannot efficiently con-

FAVORABLE REACTION TO THE SEVEN APPEALS

Cities	Work Saving	Clothes Conditioning	Sanitation	Convenience	Maid Appeal	Automatic Action	Drying Control
	%	%	%	%	%	%	%
Seattle	42	47	67	52	14	72	78
Santa Barbara	21	34	42	61	47	61	91
Phoenix	28	42	21	46	34	58	56
Houston	67	41	61	74	11	62	71
Philadelphia	54	46	58	59	21	91	81
Boston	80	42	52	51	9	84	78
Pittsburgh	67	81	47	72	10	76	87
Cleveland	42	76	34	46	9	72	78
Nashville	39	42	68	34	2	51	57
Knoxville	38	46	72	42	2	48	59
Overall Weight	**47.3**	**49.7**	**52.2**	**53.7**	**15.9**	**67.5**	**73.6**

trol your interview travel schedule, and you must waste some time getting around. The remainder of the calls I made at every other home on odd and even streets. Ratio of calls to interviews here was 2.6, higher than the telephone method. But I saved time, though I think that the telephone appointment produced the more satisfactory interview. I carried ample identification, this being vital in any door-to-door approach today.

I will admit these 200 interviews in 10 cities are not conclusive, only indicative. But no one else, to my knowledge, has gone as far to uncover clues. And I went far enough to convince myself that, whatever the city, there is enough creative, educational interest that can be aroused to make a mighty good living selling clothes dryers.

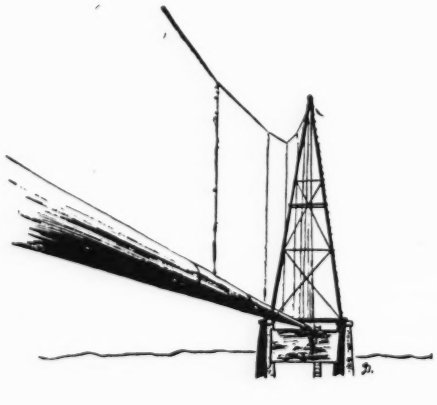
Most Disliked Tasks

The homemaking chores these women most despise are: dishwashing, dusting, laundry, de-bugging, bed making, mopping, and polishing. They dislike scouring most of all dishwashing chores. New detergents have lightened their china and glassware washing problems. The greatest of their laundry problems is clothes drying, largely because nothing about it can be time-controlled. Today's housewife is an efficient woman. She wants nothing to interfere with a schedule. She can set the automatic washer. She can command the ironer to fit her own time schedule. But she can be totally upset by her inability to order the sun and wind. This variable uncertainty created tension and disorganizes her time-planning until, when you cause her to think of it, in a sort of startled way it will dawn on her as the most confusing, frustrating and disturbing of her chores.

Clothes drying. Here is a chore that is so regular, incessant, and necessary that its annoyances have become unconsciously ingrained. She has come to the point of never thinking of them as susceptible to elimination. Because of this, the dramatic stir of their consciousness in her mind seems to hit her with a fresh, sharp, exciting realization of clothes dryer value. Almost any word picture of inconvenience I used, I found these women tending to enlarge upon. Clothes dryers have a creative selling appeal far beyond that of which I was previously aware.

Before conducting this study I had made enough pilot interviews to isolate seven appeals I wanted to use in this research. Let me briefly define them and then I will give you the statistical findings:

1. *Work Saving* . . . The elimination of line wiping, basket shoving, clothes carrying provided by the automatic clothes dryer.
2. *Clothes Conditioning* . . . The hazard of windwhip, sudden showers, and the oily scum deposited by motor traffic, particularly diesel fumes and smog, which automatic clothes drying eliminates to provide fluffy, soft, sweet-smelling results.
3. *Sanitation* . . . Avoidance of contamination with clothes of others when sent to a public laundry.
4. *Convenience* . . . The ability to wash and dry in frequent batches during the week, particularly baby things; eliminating worry of "the laundry coming back," ease in folding, sprinkling, storage; freedom from the clothespin bother.



5. *Maid Appeal* . . . The greater facility of the clothes dryer in attracting and holding maids in that hanging clothes is a mark of servility which maids now resist.
6. *Automatic Action* . . . The dryer's automatic ability to turn itself off when the housewife is downtown, or in the dead of night.
7. *Drying Control* . . . Permitting the drying function to be performed on exact schedule desired, fitted into the work or activity week, accomplished at night, on Sunday, or any hour desired with entire freedom from vagaries of weather, wind or activity program.

Varied Reactions

It is interesting to know that the 200 women interviewed in these 10 cities showed an individual interest in 2.57 of these appeals. I doubt if "the maid appeal" is worth bothering about, most women now doing their own housework.

I was careful, in the house-to-house calls, to select homes with back yards, assuming their increased susceptibility to the clothes hanging chore. Naturally, all calls were to single residences.

It means little, I presume, because they knew I was not there to sell, but 82 (41%) of these women said they could probably be persuaded to buy a clothes dryer. More interesting, 102 (51%) said they would execute the privilege of taking a washing to a free washing, drying, and ironing demonstration.

What kind of dryer, if they were to buy? Well, 144, or 72% said they believed it should be electric, many explaining that electric could be plugged in and would be portable enough therefore, to move anywhere. When I suggested that gas was the most effective and economic deliverer of heat values, or Btu, 121 (60%) said they would want to look at a gas dryer before buying.

Objections to Gas

However, there are three objections to gas mentioned often enough to be important: (1) Women dislike to ignite any burner with a match. The dryer must have automatic ignition. (2) Women think of gas appliances as requiring fixed installation. They want the dryer castored for roll-away. They do not believe gas can do this. (3) They believe a gas dryer will require a flue, otherwise that clothes dried in it will have a gas smell.

Well, there you are. My only purpose in giving away the principal results of this personal study is to convince the whiteware dealer and the utility sales manager that the American housewife anywhere can be made to want the automatic clothes dryer, and that there is a creative selling opportunity in it . . . right now, and in any season.

Southern California Companies Go After Clothes Dryer Market

IT may seem like carrying coals to Newcastle, but clothes dryers are coming to sunny southern California.

In a coordinated campaign with dealers, Southern California and Southern Counties Gas Co.'s on Dec. 15 set in motion a gigantic two-and-one-half month drive to get a foothold in what would appear on the surface to be one of the toughest markets in the nation to crack. With a minimum of rainy days in the territory, the two Los Angeles utilities and their dealers are determined to show that the many other features of the dryer can effectively sell the market.

The two companies are investing an estimated $50,000 in the promotion, including a systemwide giveaway consisting of 22 prizes, one for each sales division, and a grand prize—all told, $5000 worth of merchandise.

Three clothes dryer manufacturers—Bendix, Whirlpool, and Sears (the Kenmore line) — are also putting their weight behind the drive. An ample supply of the merchandise has been allocated to the territory to supply dealers for the duration of the special promotion.

Objectives of the promotion are threefold: First, of course, to sell more clothes dryers; but what is more important from a long-range planning viewpoint, to instill enthusiasm in dealers for the sales volume and profit potentials of the appliance; and third, to acquaint the consumer with a product about which she still knows too little. In other words, to make her want it.

Parenthetically, the gas clothes dryer is going to help keep 220-volt wiring out of the home.

What's the market potential in southern California? Gasco men confidently believe it's one per washing machine, and there are plenty of those throughout the sprawling territory.

Brooklyn Union Gas Co., with natural gas now coursing through its mains, was also readying a clothes dryer campaign last month.

A broad newspaper advertising program, broadsides, floor displays for dealers and collection agencies, easel placards, and company truck posters were drawn up to help push sales for cooperating dealers.

Promotion machinery was set in motion early when the first newspaper ads broke the week of Dec. 3. The second series of pre-campaign insertions broke the following week, the third set the week of Dec. 24. All told, 250 will appear before the contest closes Feb. 28.

Other media are being strongly exploited. The companies' popular evening concert, aired every night from Monday through Saturday, is being used. Envelope stuffers are announcing the event, listing cooperating clothes dryer dealers in the customer's area. Publicity is being carried in local newspapers. Counter and truck cards have been distributed. A clothespin with a question mark imprinted on it is being worn not only by dealers and their salesmen and gas company sales personnel but also by customer servicemen.

A 14-piece kit is being distributed to all dealers who agree to cooperate. Included are prize contest forms (150 per dealer) and a dispenser, 100 contest folders, 200 jumbo postal cards, a window banner, three paper pennants, a streamer, a huge easel-back poster, 25 facts booklets, a sales maker (one per salesman), clothespins, balloons, 25 whisk brooms, and counter and truck cards.

The postal cards are for mailing to prospects, announcing the contest and inviting them to come to the store to receive a free magnetic clothes brush. The booklets are 8-page sales stimulators which list the 10 outstanding advantages of gas clothes dryers and answer 17 pertinent questions about the product. The sales maker is an AGA-produced booklet which tells salesmen how to sell dryers.

Prizes consist of clothes dryers—one per area in the 22 territories. Persons registering at a dealer store will also be eligible for the system-wide grand prize—a complete home laundry. Prize winners will be chosen on the basis of essays of 20 words or less, completing the sentence "I want a gas clothes dryer because . . ."

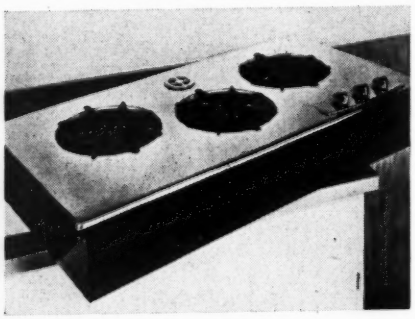
THIS BIG BANNER and the three streamers shown at the top of the page are part of the dealer kit prepared by the two utilities for the drive.

$5000.00
in valuable home prizes FREE
A Home Laundry and 22 other Big Prizes
Automatic GAS Clothes Dryer and Washer
Register Here FREE!

NEWS

CORNER ARRANGEMENT with extra oven. Here is the four-burner on-a-top section, with detached oven placed next to it and an extra oven built into the front wall of the cabinets. Any number of oven units may be used, one or more can also be added to present kitchens to supplement a standard gas range.

ONE OF THE MOST CONVENIENT arrangements of the new sectional cooking equipment. At left is the three-burner in-a-top drop-in section, at right is the in-a-wall oven, and between them is the large work surface. This is one of the many arrangements possible with this versatile equipment.



CLOSE-UP of in-a-top drop-in unit, ready for placement in standard work counter.

Manufacturers

"Sectional" Gas Cooking Equipment Unveiled

In simultaneous unveilings in major U. S. cities, Chambers Corp. last month previewed for utility executives, appliance dealers, and the press its brand-new "sectional" gas cooking equipment—the gas industry's answer to the sectional electric range.

The units, first gas burner tops and separate ovens to be offered with AGA laboratories approval, will be distributed nationally after Jan. 1. Advertising and promotion plans for the new developments, expected to be large, have not been settled.

New Chambers products include the "in-a-wall" oven—a separate oven unit that can be built in kitchen walls for greater space efficiency and convenient height level—and "in-a-top" burner units—three burners mounted on a stainless steel top, with on-top push-type valve handles, which can be built in any sink counter top with a minimum length of 42 in. and a depth of 22 in. Also being developed is a four-burner "on-a-top" unit, which requires only a 24-in. wide base cabinet.

Chambers officials expect the units to gain immediate favor with housewives. They will allow a "personalization of the kitchen" in that ovens can be placed at the height most convenient for the user, and the oven-burner arrangement can be decentralized within the kitchen for greatest efficiency. In addition, without buying an entire range, families with exceptionally large requirements may add an extra oven.

The Chambers "in-a-wall" ovens include all the features of the company's standard range ovens. They are insulated so that they may be installed in walls without overheating, and will "cook with the gas off" because the insulation retains the heat. Oven air intakes are located just below the oven door, and venting hoods are just above the doors. The ovens are large enough to hold a 30-lb turkey, 40 lbs of meat, or eight pies.

Units are available in stainless steel or in porcelain enamel in seven different colors.

Behind the development of the units lies a story of extraordinary utility-manufacturer cooperation. In Toledo, Ohio, the owner of the Park Lane apartments was beginning the remodeling of a large group of apartments renting to elderly people who did not want to use the low-style oven standard in most makes of gas and electric ranges. Plans were drawn specifying the installation of in-a-wall ovens, which were then available only in electric models.

But the high cost of rewiring 85 apartments for 220-volt service gave the Ohio Fuel Gas Co. an opportunity to get its foot in the door. The utility called in Chambers executives, and after a great deal of planning suitable gas units were developed. The AGA laboratories gave the official stamp of approval, and 25 Chambers in-a-wall and in-a-top sections were installed.

The other 60 apartments will be similarly furnished when tenants' leases expire.

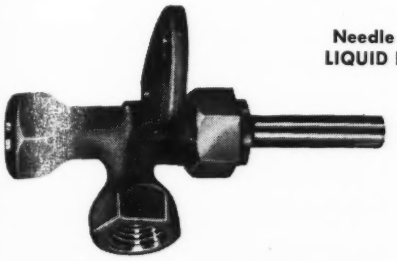
Simpson Opens New Plant

Aurora, Ill. is the location of a new plant recently leased by Simpson Electric Co., Chicago. Five factories—three in Chicago and one in Lac du Flambeau, Wis.—are now turning out panel instruments and test equipment for Simpson.

The Aurora factory is a 31,000-sq ft, two-story building. Preparation of the plant for maximum production was completed in December, according to Wallace Carroll, president.

Newsnotes

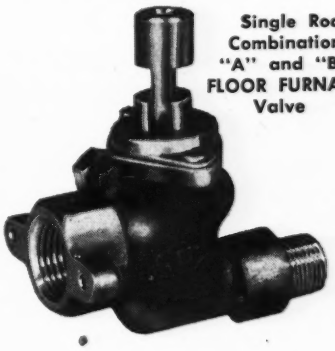
A patent covering the basic process for the production of oil gas, popularly known as the "high-Btu oil gas process," has been granted The Gas Machinery Co., Cleveland,



Needle Adjusting
LIQUID FUEL Valve

Specific customers met with particular design or engineering problems—Detroit Brass was consulted and these valves resulted.

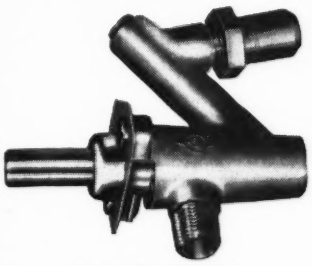
3-Rate ROOM-
HEATER Valve



Single Rod
Combination
"A" and "B"
FLOOR FURNACE
Valve

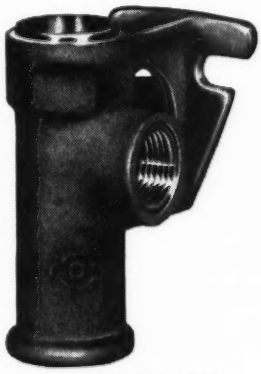
STANDARD or SPECIAL

Detroit Brass Offers Design, Engineering and Production Facilities To Deliver Functional Brass Components That Meet Today's Exacting Requirements.



Offset Angle GAS
RANGE Burner Valve

Appliance Engineers created these valves and Detroit Brass production experience and facilities produced them.



AIR CONDITIONING
Humidifier Bracket

If your problem involves design, engineering, or production of brass valves or fittings, standard or special, we have something to offer you.

Detroit Brass developments in special purpose components are indications of how this company may be of service to you.

When you require assistance in solving a problem Detroit Brass would like to work with you.

Detroit Brass service to many industries is the best indication of what we may be able to do for you. Some of the industries for which we have produced functional machined-brass castings in volume and variety—always on the same top-quality level:

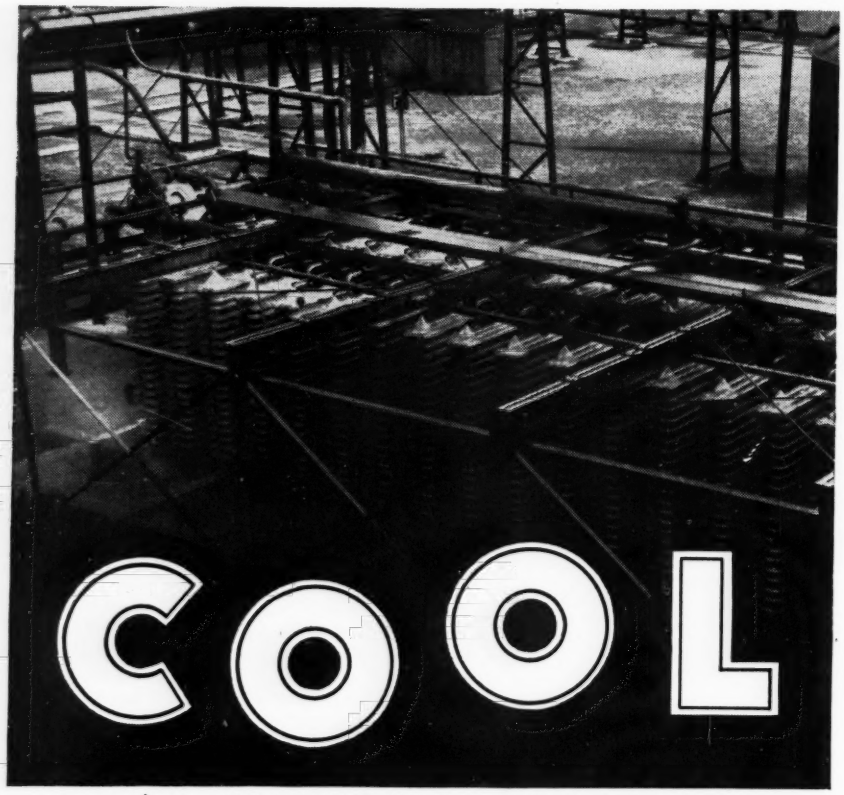
Air Conditioning • Aircraft • Automotive • Beverage • Diesel Engine • Dry Cleaning • Farm Equipment • Gas Appliances • Locomotive • Maritime • Oil Refining Equipment • Oil Heating Equipment • Plumbing • Refrigeration • Rubber • Spray Equipment • Washing Machine • and others.

GAS VALVE DIVISION . . . . . .

DETROIT BRASS & MALLEABLE WORKS

DETROIT 9, MICHIGAN

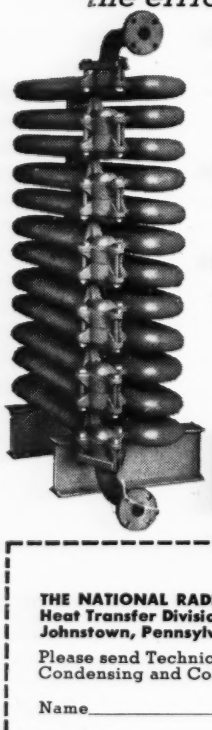
A National Section Wash Oil Cooler in the Hazelwood, Pennsylvania by-product coke plant of Jones & Laughlin Steel Corporation.



with **NATIONAL SECTIONS**

efficient - durable - compact - accessible

The durability of cast iron combined with the efficiency of modern extended surface.



IN NATURAL GAS REFORMING

—Scrubbing Liquor Coolers, Washer Cooler Exchangers, etc.
—Compressor water coolers for closed system cooling jackets of power and compression cylinders, inter-cooler and after-cooler coolants.

IN MANUFACTURED GAS OPERATIONS

—Scrubbing Liquor Coolers, Final Cooler Liquor Coolers, Compressor Coolers.

IN BY-PRODUCT COKE PLANTS

—Ammonia Liquor Coolers, Wash Oil Coolers, Compressor Coolers, Final Cooler Liquor Coolers.

Heat Transfer Division

NRC THE NATIONAL RADIATOR COMPANY
JOHNSTOWN, PENNSYLVANIA

SEND COUPON TODAY

THE NATIONAL RADIATOR COMPANY,
Heat Transfer Division, Dept. G
Johnstown, Pennsylvania

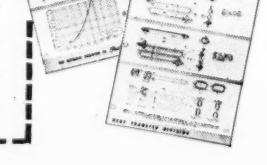
Please send Technical Manual HT-20 on National Condensing and Cooling Sections.

Name_____

Firm_____

Address_____

City_____ Zone____ State_____



Clifford E. Paige, president of The Brooklyn Union Gas Co., looks over prize-winning annual report advertisement for which his company was awarded two "Oscars-of-Industry" at recent "annual report dinner" given by *Financial World*. A silver Oscar was won for the best advertisement of this type directed by an American business institution to its local community. A bronze Oscar was received for the same annual report advertisement as the best in the public utility field.

Ohio. The process differs essentially from the Pacific Coast oil gas process in the extent of cracking which takes place, and the gas produced has a higher heating value. No solid fuel bed is employed, nor does any extensive water gas reaction occur.

In celebration of the company's 50th anniversary of gas industry manufacturing activity, Sprague Meter Co. held an open house in its Los Angeles offices last month. More than 150 industry members attended the affair, for which H. L. Spencer, Sprague's western manager, served as host. The celebration commemorated another anniversary, too—1950 is the tenth year the Bridgeport, Conn. company has maintained an office in Los Angeles. In June, more than 2000 employees and their families attended a similar anniversary affair held at the home office in Bridgeport (*GAS*, August, p. 74).

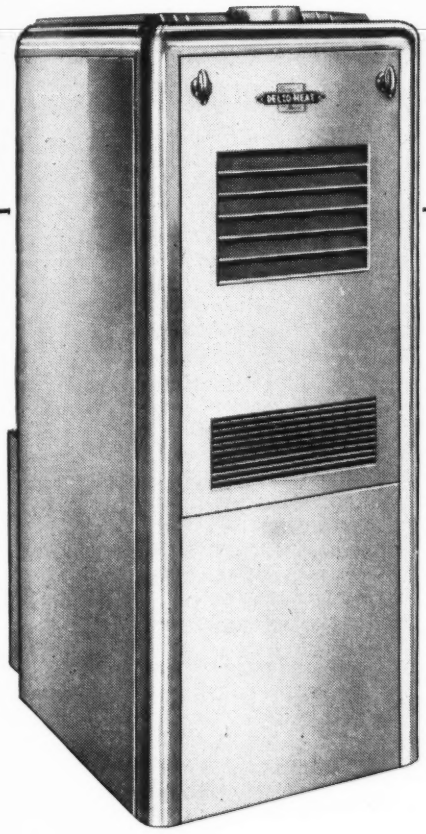
Financial

Pipeline Firm to Share Rebate With Customers

A plan submitted by Mississippi River Fuel Corp., St. Louis, for distribution of funds created by overpayment of gas rates during rate-setting proceedings will result in the payment of $545,000 to the firm's local utility customers and the retention of $939,600 for itself.

The Supreme Court last month refused to rule on whether such funds should be retained by a pipeline company or passed on to its customers. The money was collected between 1943 and 1947 when the FPC was investigating rates charged by Interstate Natural Gas Co., producer of the gas, and

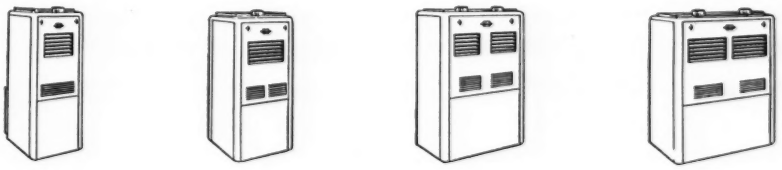
DELCO-HEAT UNITS ARE PRODUCTS OF GENERAL MOTORS



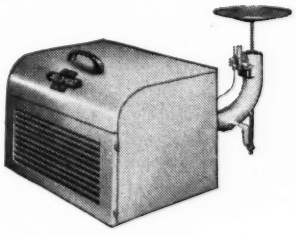
. . . That's why this outstanding gas-fired line is tops in value, in dependability and in engineering features!

Here is everything you want in gas-fired, forced warm air furnaces—the new Delco-Heat "GA" series of Conditionairs! The line includes five models with input capacities of 62,500, 90,000, 120,000, 150,000 and 210,000 Btu—available with either 12 or 16 gauge steel heat exchangers. All models have been AGA-approved for natural, artificial and mixed gas fuels—for LP and LP-Air gas and for high-altitude installations.

The "GA" Conditionair has the exclusive welded-steel Multi-Rad heat exchanger system—ribbon-type burners—and a blower-filter unit powered by Delco Appliance's famous *Rigidframe* motor. The units are extremely good-looking in their Delco-green finish—compact and trim—without exterior draft hoods or exposed gas controls. Competitively priced—unmatched for value!



New DELCO-HEAT conversion gas burner covers range from 75,000 to 300,000 Btu input!



The Delco-Heat gas burner is an up-shot, single-port type, with a stainless-steel flame spreader that directs the flame evenly and efficiently to all sides of the combustion chamber. Air and gas are mixed for perfect combustion through a telescopic venturi tube. This telescopic feature, plus the adjustable orifice and simplified over-all design, make its installation in any furnace or boiler extremely easy.

The new Delco-Heat gas burner is AGA-certified for natural, artificial and mixed gas fuels. Amazingly low in first cost, economical to operate, and built for years of service—the Delco-Heat Burner is today's greatest value in gas conversion burners!

Also manufacturers of gas and oil water heaters and electric water systems for farms and houses.

It's easier to sell Delco-Heat products than it is to sell against them!

The Delco-Heat line includes oil, gas and coal-fired units . . . for warm air, steam or hot water systems . . . for all sizes of homes. Engineered right, priced right! If you are interested in the profit possibilities of the Delco-Heat franchise, send coupon now!

GENERAL MOTORS DELCO-HEAT

DELCO APPLIANCE DIVISION
General Motors Corporation
Rochester 1, New York Dept. G-20

Please send me information about the Delco-Heat franchise.

Name.....

Firm Name.....

Street.....

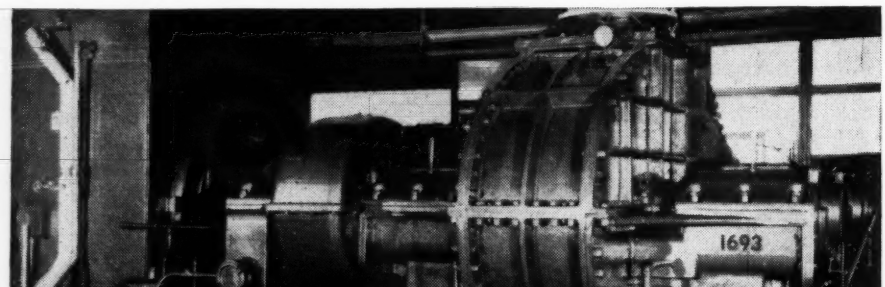
City..... *Zone*..... *State*.....

NEW R·C EXHAUSTER
pays its own way

By replacing a 30-year-old battery of three steam-driven gas exhausters with a new, high-capacity, electrically-driven R-C unit, important advantages were gained, in a large industrial plant:

1. **The one new unit carries the base load.**
2. **Steam needed for 5 other steam-driven exhausters, carrying partial load, is substantially reduced because of slower speeds.**
3. **Heat balance in the plant is maintained.**
4. **Savings in total power cost will pay for the new installation in about one year.**

These very satisfactory results were obtained by careful evaluation of all the factors before deciding upon the type of equipment . . . and then by specifying an R-C Rotary Positive Gas Exhauster that will do the work at low operating cost.

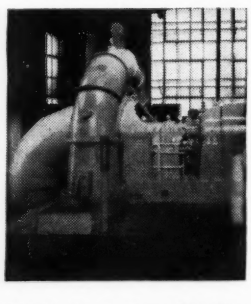


Type RCGH Rotary Positive Gas Exhauster, driven by 450 hp synchronous motor. Capacity, 20,600 cfm.

Even though your equipment to handle gas or air may still have years of life, it may be sound economy to replace it with modern, efficient, R-C units of the right type, size and drives to best meet your needs. Our engineers will help you analyze your problem and make unbiased recommendations of either Rotary Positive or Centrifugal equipment, depending upon your specific conditions. This *dual choice* is an exclusive R-C advantage.

With capacities from 5 cfm to 100,000 cfm, R-C units can be closely matched to work requirements, for dependable, economical performance. At Roots-Connersville, almost a century of blower building experience is at your service, without obligation.

ROOTS-CONNERSVILLE BLOWER CORP.
151 Oregon Avenue, Connersville, Indiana



Single-stage, Type OIB Gas Exhauster in gas utility plant. Capacity 39,950 cfm.

ROOTS-CONNERSVILLE
BLOWER BUILDERS SINCE 1854
ONE OF THE DRESSER INDUSTRIES

the difference between actual and proposed rates was impounded.

A court of appeals ruled that the money should go to those who actually paid it to Interstate—Mississippi and two other pipeline companies. Then the Supreme Court reversed the appeals court's decision and ordered that the fund be distributed to eventual consumers of the gas. Mississippi agreed to pass on to its local utility customers part of the impounded funds but would not refund payments collected from direct industrial users. Of the company's fifty-five industrial consumers, nine asked for a proportionate benefit from the rate reduction. It was this claim that the Supreme Court refused to review.

Illinois Cities Repaid For Lost Utility Revenue

Lockport township and Dixon, Ill. received a tangible Merry Christmas wish from Public Service Co. of Northern Illinois, Chicago: $1½ million to replace tax money of which the two communities will be deprived because of a proposed utility merger.

Western United Gas & Electric Co. and Illinois Northern Utilities Co. are to be merged into Public Service. All are Commonwealth Edison subsidiaries.

An Illinois state tax is levied on capital stock and collected by the community in which a corporation's legal home office is located. Public Service Co.'s payments to compensate for this lost revenue will be equal to the taxes in each community the first year, 80% of that amount the second year, and 60%, 40% and 20% in succeeding years.

October Sales up 18%

Utility gas sales for October 1950 were 18.9% more than during October 1949, AGA has reported. For the 12 months ended Oct. 31, sales gained 15.6% compared with the previous 12 months.

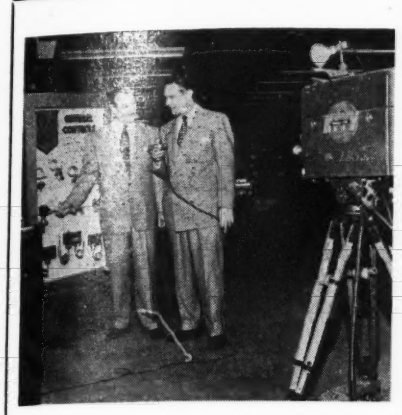
Comparing sales for October 1950 and for the preceding 12 months with the same periods the year before, the only category to show a decrease is manufactured gas—down 12.9% for the month and 1.5% for the year. Conversions to mixed or natural gas are responsible for the decline.

For the same periods, natural gas sales gained 21.4% and 17.2%, mixed gas sales were up 11.2% and 5.1%.

Financial Notes

Virginia's state corporation commission in late November authorized Suffolk Gas Corp. to purchase Suffolk Gas Co. for $205,000. Proceeds of two securities issues approved by the commission were to be used to buy the company, to convert its utility plant to natural gas, and to make other improvements.

Early last month a stock transaction reported to involve more than $10 million resulted in the sale of Houston Industrial Gas System and the formation of two operating companies to distribute the gas. The new firms, both incorporated in Delaware, are Industrial Gas & Supply Corp. and the Ship Channel Industrial Gas Corp. F. M. Corzelius was president and owner of Houston Industrial.



First subject of a new television series Richfield Oil Corp. is sponsoring in southern California was General Controls, manufacturer of instruments for the gas industry and other industries. Titled "Success Stories," the series takes the viewers behind the scenes of important plants and factories in the growing industrial areas around Los Angeles.

During the hour - long telecast, Vice President J. F. Ray of General Controls (left, above) and Announcer Keith Hetherington, toured the huge plant, interviewing employees and discussing operations. With about 800,000 set - owning families in the area, the General Controls story was assured of a broad audience.

A downward trend in earnings of straight manufactured gas companies which had prevailed for six years was reversed in 1949 when these firms showed utility operating income equivalent to 10.4 cents per dollar of operating revenue, according to information released by the American Gas Assn. Net income rose to 7.7 cents per dollar as compared with 4.8 cents in 1948. Gas departments of combination companies reported 0.1 cent of utility operating income per dollar of gas operating revenues for 1949 and natural gas companies showed a ratio of 15.9 cents, slightly less than the previous year.

Expansion

46,000 New Househeating Units in Chicago Foreseen

If progress on Texas-Illinois Natural Gas Pipeline Co.'s line continues on schedule, with completion expected Nov. 1, Peoples Gas Light & Coke Co., Chicago, plans to add 46,000 families to its list of househeating customers during the next two winters.

At a mid - December press conference, Chairman James F. Oates said about 310 miles of pipe in the projected 1419-mile line had been laid.

Peoples Gas at that time had a waiting list of 90,000 homes, and it was reportedly growing at a rate of 3000 a month. Mr. Oates pointed out, however, that in the past as many as 35% of those on the waiting list have refused gas service for one reason or another when their turn came. If this holds

A SIMPLE SOLUTION for one of the GAS INDUSTRY'S *most trying problems*

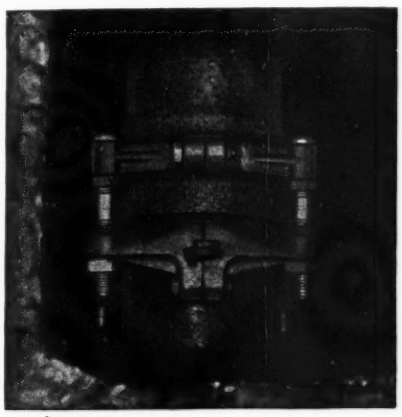
the **NORMAC**

BELL JOINT CLAMP

SOLVES YOUR JOINT REPAIR PROBLEMS

QUICK • EASY • PERMANENT

6 inch Normac Clamp being lowered into hole for installation



6 inch Normac Clamp in service after installation

Installed in small pavement openings. Available in all standard sizes from 3" to 12". A simple set of tools cleans the joint, installs the clamp . . . often in only a quarter of an hour. SAVES TIME. SAVES MONEY and the repair is permanent. Designed for all conditions particularly where pavement repair costs are prohibitive. Such small opening repairs are scarcely noticeable when pavement is replaced.

Normac Clamps can be installed in large as well as small openings.

Norton - McMurray hold definite leadership in the development of methods for installation and rehabilitation work through small openings. We welcome the opportunity to help solve a problem you may have—tell us about it.

Write for our catalog describing our complete line of COUPLINGS . . . FITTINGS . . . SERVICE TEES and ELLS . . . SLEEVES . . . COMPRESSION-END COCKS . . . METER BARS and BRASS FITTINGS for copper pipe.

NORTON-McMURRAY MFG. CO.

39 SOUTH LA SALLE ST. • CHICAGO 3, ILL.

Method and product covered by U. S. Patents, Nos. 2,163,261 and 2,178,286.

true, the list will be almost erased after completion of the new line.

1529 Public Housing Units Announced

President Truman has authorized the Public Housing Administration to make preliminary loans to local housing authorities in an additional 21 localities in 12 states for the construction of 1529 low-rent homes for low-income families. The approved loans total $467,150 and will allow the planning of nearly $13 million worth of public housing.

The approved list, which includes only authorities whose local governing bodies have formally approved the loan applications, as required in the Housing Act of 1949, names the following communities:

Alabama — Hartselle; Arkansas — Magnolia; Connecticut — Ansonia, Derby, Norwich; Florida — Melbourne, Merritt Island, Mims; Georgia — Douglasville, Greensboro, Villa Rica; Michigan — Ironwood, Norway; New York — Binghamton; Pennsylvania — South Fayette Township; South Carolina — Bennettsville; Tennessee — Jefferson City, Murfreesboro, Rockwood; Texas — Dallas, Pottsboro, Ector; Virginia — Bristol.

New Offices for United

Construction of a modern office, warehouse, meter shop, and garage building at Beaumont, Texas was to get under way Jan. 1 for United Gas Corp.

A 100-seat auditorium which will be available as a meeting place for civic groups is one feature of the new structure. The auditorium stage will be equipped with a modern gas kitchen. All-year air-conditioning equipment will be installed in the offices and auditorium.

Other features of the new quarters include a special station where customers may pay bills, "levelators" for rapid unloading of carload shipments in the warehouse, and a 40-unit car and truck storage shed plus a 50-car parking lot for employees.

Newsnotes

Gas utilities in Mississippi have reported that 5642 homes were added during the past year to the list of those receiving gas heat. Furthermore, if heating materials continue to be available, 5769 more homes will be gas-heated by the end of 1951. This 13% increase anticipated for the two-year period is credited to rapid expansion of natural gas pipelines on which $22,851,000 has been spent in the state since 1946.

New and enlarged quarters for the Washington, D. C. office of Ebasco Services Inc. were opened at 1625 I St. N.W. on Dec. 15.

*Production of gas e*nrichment oil in the New York City area will probably be cut back this year because of the arrival of natural gas. Consolidated Edison Co. of New York Inc., which used 215 million gals. of this oil to manufacture gas in 1949 and even more in 1950, will probably now require the special light residual oil only during winter peaks.

Recording Sales Talks Improves Technique

Brooklyn Union Gas Co.'s salesmen are talking to themselves.

It's all in the line of business, however. They're doing it via a tape recording program, which, although it was introduced into Brooklyn Union for an entirely different reason, is enabling the company's salesmen and women to do a better sales job with better sales presentations. And they know just which parts of their sales stories are most important and most effective—because they have previously recorded them, heard them played back, and had them criticized, point by point, by their colleagues and by BU's sales training staff.

Brooklyn Union first started using recordings as an aid to its sales instruction training. Andrew Tomanek, staff assistant in the new business department, devised the system for use in determining how much had been absorbed in his sales instruction classes. He directed his students to prepare a full sales presentation, and for convenience in judging the results, he used a Soundscriber to record their talks. Rehearsed or memorized sales stories were discouraged. Mr. Tomanek wanted his trainees to present their talks as though they were talking to a prospect—with the facts of the presentation arranged in a logical flexible pattern.

The results of the first recordings were remarkably good — so good that Brooklyn Union executives gave Mr. Tomanek the go-ahead for more extensive use of his recording machine. He took the best of the trainee recordings and made them a permanent part of the company's training program — each emphasizing a particular style of delivery or good continuity or an unusual approach to the selling problem.

Next, classes were organized for all Brooklyn Union salesmen, who were instructed in the operational advantages of various appliances. And as the "old guard" sales crew joined the trainees in the record-making practice, a need for more detailed and timely information about features of the individual appliances was realized. The result of this need was the setting up of classes by manufacturer's representatives — who heard the sales recordings as they would be given in the field, criticized them, and showed how they could be improved. Some manufacturers representatives even went out into the selling field with Brooklyn Union salesmen, so that they could more easily grasp the selling problem in the Brooklyn territory and thus be in a position to offer more help in preparation of sales presentations.

Mr. Tomanek's program has continued to expand since its inception. Brooklyn Union now holds a regular competition for sales recordings made by salesmen, with prizes awarded for the best efforts.

Andrew J. Tomanek (left) adjusts the volume on the recording machine while John Mansell gives his sales pitch to the microphone.

Courtesy *Servel News*.

Miscellany

Conservation Law Studied

Utah's 1951 legislature will consider an oil and gas conservation statute, calling for establishment of a state oil and gas conservation commission, which has been submitted to Gov. J. Bracken Lee by Arthur L. Crawford, director of the state's geological and mineralogical survey.

Mr. Crawford said the legislation is needed to prevent gas and oil waste, to maintain gas pressure, and to avoid cut-throat competition.

If the bill is adopted in its present form, gas and oil discovered after March 1, 1951, would be subject to its provisions.

IGT Offers Fellowships

Fifteen fellowships leading to degrees of master of gas technology and doctor of philosophy are being offered by the Institute of Gas Technology, Chicago. Each provides an award of $1250 (tax-free) and tuition for each of the first two years.

Gas companies throughout the country cooperate by providing summer employment for students.

Applications and requests for information should be addressed to the director, Institute of Gas Technology, Technology Center, Chicago 16, and must be submitted before March 15.

Buchanan Reelected

FPCommissioner Thomas C. Buchanan, of Pennsylvania, was re-elected vice chairman of the commission on Dec. 5. Mr. Buchanan has been a member of the FPC since 1948, vice chairman since May 1950. His present term is for the calendar year 1951.

New chief of the FPC division of gas certificates is Loring E. Heckman, an FPC staff member since 1945. He succeeds James V. O'Connor, who resigned early last month to enter private practice.

ConEd Honors 34 Heroes

Thirty-four employees of the Consolidated Edison Co. system have been awarded the company's meritorious service certificate for saving life, protecting public or company property, and for personal acts beyond the normal requirements of their jobs. Since the plan was instituted 24 years ago, 1052 certificates have been issued.

PEOPLE

Six men recently were added to the staff of the Ingersoll Steel Division, Borg-Warner Corp., Kalamazoo, Mich. The men and their new positions are LAWRENCE HODGE, salesman in western Pennsylvania and Ohio; JAMES NEALL, salesman in Indiana and Michigan; H. FORREST OAKES, Midwestern sales representative; W. B. JOHNSON, assistant advertising manager; PAUL J. FETZEK, chief sales engineer, and JOSEPH BAUER, assistant sales engineer.

Officials of Georgia Institute of Technology recently announced that JOHN C. LANE, former head of information service for the Institute of Gas Technology, Chicago, has joined the faculty as a research professor and head of the technological information service. Mr. Lane was associated with Gulf Oil Co.'s research and development department for several years before joining IGT in 1948.

Rockwell Manufacturing Co., Pittsburgh, has named W. F. WEIMER as advertising manager, succeeding W. A. Marsteller (*GAS*, December, p. 62). Mr. Weimer has served as advertising manager of the Pittsburgh Equitable Meter Division for the past few years, and he was formerly editor of employee publications.

W. F. Weimer
... *Rockwell*

C. E. Newman
... *Surface*

All lines of Surface Combustion Corp. (Toledo) standard industrial equipment will be handled by CHARLES E. NEWMAN in his new post as sales engineer for the company's Chicago territory. Mr. Newman has been with Surface since 1936, in the home office since 1943.

Announcement of HARRY J. BAUER'S election as vice president in charge of purchasing and stores, fuel and commercial buildings for Consolidated Edison Co. of New York Inc. was made recently. Mr. Bauer retains his post as president of New York Steam Corp. KENDRICK F. BELLOWS, former division engineer in ConEd's engineering department, has rejoined the system as assistant to the chairman.

Appointment of L. GALE HUGGINS as product planner for the General Electric Co. air conditioning department in Bloomfield, N. J., has been announced. Mr. Huggins was associated with Westinghouse Electric Corp. for many years, and, more recently, was vice president and general manager of the Horix Manufacturing Co., Pittsburgh.

Pick a winner every time—insist on genuine TOLEDO Pipe Tools for the job! These are the tools preferred for nearly half a century by better mechanics... and used so widely today to thread, cut and ream pipe at *top-speed*... with *less effort*... and *lower cost.*

Your choice—a complete range of 29 quality-built TOLEDO tools for all pipe sizes, ⅛" to 12", and ¼" to 1" bolts... also high-production power pipe machines, up to 2" and 4" capacity ... and portable power drives. Get time-proven TOLEDO advantages for every pipe fitting requirement! Write for catalog. The Toledo Pipe Threading Machine Co., Toledo, Ohio. New York Office: 165 Broadway, Room 1310.

RELY ON THE LEADER **TOLEDO**

POWER DRIVES...PIPE TOOLS...POWER PIPE MACHINES

New president and director of the Ohio Gas Co., Bryan, is C. B. MELTON, who has been vice president and general manager of the firm since 1947. The company also announced that C. L. FLEMING, treasurer, has added "assistant secretary" to his title.

American Radiator & Standard Sanitary Corp., Pittsburgh, has announced a number of personnel changes. D. D. COUCH, vice president and general manager of sales, was elected to the board of directors. The firm's Tonowanda iron division has a new president — CHARLES R. HOLZWORTH, former vice president and general manager. S. K. AUGUSTINE and H. WATSON PADDOCK, long-time employees of American-Standard, were appointed assistant comptrollers, and HOWARD L. SPINDLER, manager of advertising and sales promotion, was named director of public relations.

The Welsbach Corp., Kitson Division, Philadelphia, has extended the sales territory of FRANK E. DOUPNIK, who headquarters in San Francisco, to include the three Pacific Coast states, Arizona, and part of Nevada.

Equitable Gas Co., Pittsburgh, has named GEORGE W. BROWN superintendent of its new Division D, distribution department. In addition, Mr. Brown is supervising operations of the recently acquired Bellewood & Monongahela City Natural Gas Co. F. J. MCKENNA has been appointed to a similar position in Division E. He has been with Equitable since 1912.

Recent personnel changes at Koppers Co., Inc., Pittsburgh, include the appointment of JOHN B. KEELER, traffic and transportation department manager, as a vice-president; the retirement Dec. 1 of J. N. FORKER, vice-president and general manager, tar products division, and his replacement by FRED C. FOY, former sales department head and a newly elected vice president; and the naming of DR. GILBERT THIESSEN, chemical division technical advisor, as manager of the research department laboratory section and of DR. WILLIAM C. DEARING as assistant manager.

E. E. JEFFE, Consolidated Edison Co.'s vice president in charge of sales, recently retired at his request. His career with Con-Ed began when he joined Brooklyn Edison after leaving college and, with time off to serve in both world wars and to engage in private engineering practice for a while, General Jeffe's entire business career was with the New York utility system.

E. E. Jeffe
. . . ConEd

H. W. Geyer
. . . Grayson

On Dec. 29, HELMUT W. GEYER left his position as utilization engineer for Southern Counties Gas Co., Los Angeles, to become director of the West Coast Research & Development Laboratory, Grayson Controls Division, Robertshaw-Fulton Controls Co. Mr. Geyer had been with SoCounties since 1929 when he joined the company as research engineer.

A portion of the home service territory handled by Eleanor Marvin for The Manufacturers Light & Heat Co., Pittsburgh, has been assigned to MISS JUDITH NICELY, newly appointed home economist. Miss Nicely will headquarter in the East Liverpool, Ohio office.

JOHN C. DEUPREE, assistant advertising and publications manager for Oklahoma Natural Gas Co., has succeeded HOWARD W. JONES as advertising manager. Mr. Jones is now an account executive with Ketchum, MacLeod & Grove Inc., Pittsburgh. Oklahoma Natural also announced the appointment of H. C. WEBB, formerly of the Puget Sound Power & Light Co., Seattle, as general sales manager.

Boston Consolidated Gas Co.'s president EARL H. EACKER, has been re-elected to the board of directors of the American Standards Assn. His three-year term began Jan. 1.

Why LMPCO Metal Rim Diaphragms

Last Longer

It's no trade secret that the LMPCO Metal Rim Diaphragm stays in the meter for 10 . . . 15 . . . 20 years or more, giving accurate and dependable service. Thousands of service records prove this. *But why?*

Superior quality is the answer to LMPCO's outstanding service record. Design, materials and workmanship are of the finest quality. Every construction feature and detail of LMPCO Metal Rim Diaphragms fit together to help assure more years of accurate service in your gas meters.

METAL RIM DIAPHRAGMS

Write today for the quality story back of LMPCO Metal Rim Diaphragms.

Lancaster METER PARTS CO.
POST OFFICE BOX 378 . . . LANCASTER, OHIO

American Stove Co.'s (St. Louis) northern sales division manager, TRACY B. MADOLE, has succeeded L. L. PETERS as commercial sales manager. Mr. Peters recently became LP-Gas sales manager. J. J. KNOTEK has replaced Mr. Madole in Chicago.

D. B. BISHOP, a salesman for Dearborn Chemical Co., Chicago, since 1937, has replaced J. A. CRENNER as manager of the Pittsburgh office. Mr. Crenner retired recently. He was also executive vice president of Dearborn Chemical Service Corp.

American Natural Gas Co., New York, has elected THOMAS K. HUMPHREY as vice president and secretary. Mr. Humphrey formerly held the same position with the recently liquidated United Light & Railways Co.

More than 200 friends and co-workers attended the recent retirement dinner held for C. S. GOLDSMITH, Brooklyn Union Gas Co.'s engineer of distribution since 1941. Mr. Goldsmith joined the utility in 1921 and held a number of positions in the distribution department. He was chairman of the AGA technical section during 1946 and 1947, has been active on AGA committees, and has written a number of technical articles.

C. S. Goldsmith
... Brooklyn

P. V. Cheli
... Bryant

Appointment of PETER V. CHELI as Chicago branch manager of Bryant Heater Division, Affiliated Gas Equipment Inc., has been announced by the Cleveland firm. Mr. Cheli succeeds WILLIAM H. WISE, who joined the home office staff as assistant to J. N. Crawford, director of sales.

Duties of the late CHARLES A. AARON, assistant safety director of The Manufacturers Light & Heat Co., Pittsburgh, and associated companies, have been taken over by J. H. DIVINE. Mr. Divine has been in the firm's treasury department since 1938.

Appointment of JOHN FARRAR as assistant sales manager of the Mor-Sun Furnace Division of Morrison Steel Products Inc., Buffalo, N. Y. was announced recently. He was promoted from manufacturer's sales representative for the division.

DAVID G. REYNOLDS has been appointed to the staff of Selas Corp. of America, Philadelphia, as petroleum engineer in the refinery division. He was formerly with The Lummus Co.

FRED C. HOLBROOK has joined M. M. Hedges Manufacturing Co. Inc., Chattanooga, as sales representative in the gas utility sales division.

- OBITUARIES -

GEORGE W. BEAN, Washington manager of the American Gas Assn. from 1928 to 1946, died on Nov. 20 at the age of 75. He had a long political career and was active in the Cuban fight for independence, later serving as chief engineer of sanitation in that country.

On Dec. 7, E. J. MEADE, 50, president of the Hoosier Gas Corp. of Vincennes, Ind. died unexpectedly. Mr. Meade was formerly manager of the Roanoke (Va.) Gas Co.

L. T. W. TIMBERLAKE died Nov. 27 after a short illness. Mr. Timberlake had served as manager of the gas utility sales division for M. M. Hedges Manufacturing Co. Inc., Chattanooga, Tenn. and was chiefly responsible for that company's line of Utility gas water heaters.

On Nov. 15 PERCY S. YOUNG, who retired two years ago as chairman of the executive committee, Public Service Corp. of New Jersey, Newark, died. Mr. Young had a long utility career which included service on the executive board of the AGA and the presidencies of the National Commercial Gas Assn. and the Eastern States Gas Conference.

Union Electric Co. of Missouri, St. Louis, has announced that LOUIS H. EGAN, 69, former president of the company, died Nov. 25. Mr. Egan became president of Union

ARCCO
The World Over
wherever there is gas
ARCCO-ANUBIS
'Dry-Air GAS
GRAVITOMETERS
This new Arcco-Anubis Dry Air Gas Gravitometer determines and records specific gravity of gases automatically corrected to the humidity content of the air. The difference in weight between a column of GAS and equal column of DRY AIR is measured. This ratio represents the true specific gravity of the sample.
One bell of the instrument is filled with gas which is being measured, and the other bell is filled with dry air. Otherwise, except for the new instrument having one column for gas and one column for dry air, the unit is identical in operation to the standard gas gravitometer. When calibrated and properly installed, these instruments require little attention other than to wind the clock, ink the pen, and change the chart. Send for bulletin No. 101.
AMERICAN
RECORDING CHART CO.
3113 E. 11th St. • Los Angeles 23, Calif.
Available for Early Delivery
SEND FOR BULLETIN No. 101

Electric in 1920, at the age of 38, and he retired in 1939.

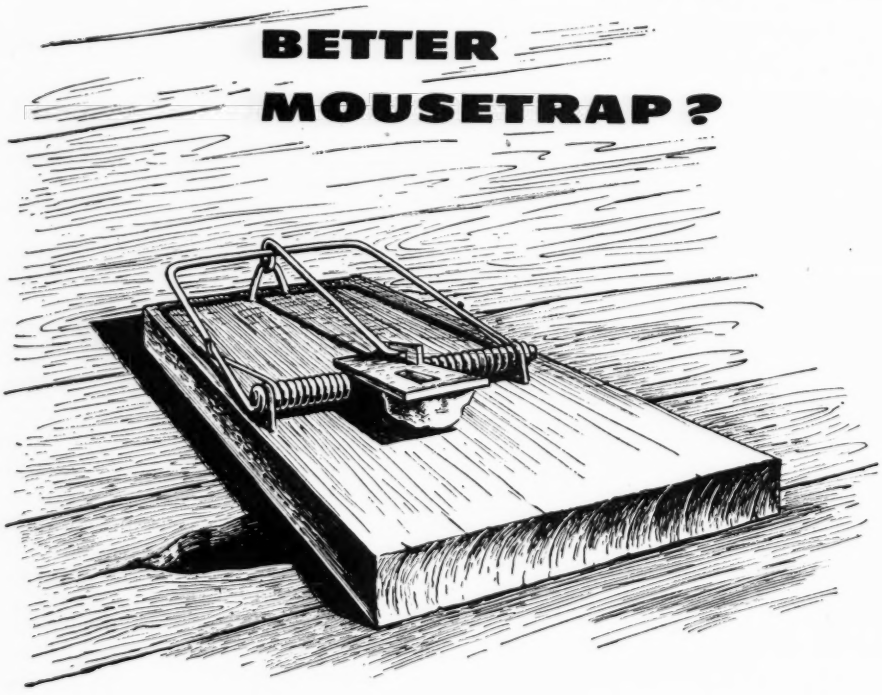
DON S. NOSLER, 63, personnel and safety director of the Western New York division, New York Electric & Gas Corp., died recently in Lockport, N. Y. He began his career with the Rochester Gas & Electric Corp.

DANIEL L. SCOTT, 70, retired advertising manager of Southern California Gas Co., passed away in late November. Mr. Scott joined the Los Angeles Gas & Electric Co., later absorbed by SoCal, in 1908.

Early in November, TEMPLE W. TUTWILER, a director of the Arkansas Natural Gas Corp., Shreveport, and chief engineer and a director of Cities Service Co., New York, died at his home in Birmingham, Ala. Mr. Tutwiler was also a director of Empire Gas & Fuel Co., Arkansas Pipeline Corp., and Arkansas Louisiana Gas Co.

JOSHUA A. PEARSON, retired vice president of United Gas Improvement Co., Philadelphia, died Dec. 2 at the age of 78. On Dec. 1, WISTAR MORRIS, treasurer of the company from 1915 until his retirement age, passed away.

ALVIN A. RANSHAW, president and general manager of The Stacey Manufacturing Co., Cincinnati, for the past 20 years, died Nov. 11.



The story of the reward for a better mousetrap is proverbial. But the fact remains that most mice are still caught by this simple, economical and effective contraption.

Gas purification is a parallel case.

Iron Sponge, preferred for the removal of H_2S seventy-five years ago, is still preferred today. And for these same reasons . . . simplicity, economy and effectiveness.

Iron Sponge operates with high efficiency at high or low pressures, has excellent capacity and activity, gives long service between foulings and is simply and quickly regenerated.

CONNELLY, Inc.

3154 S. California Ave., Chicago 8, Ill.
Elizabeth, N. J. • Los Angeles, Calif.

TRADE LITERATURE

SURFACE COMBUSTION CORP., Toledo 1, Ohio — Bulletin SC-146 discusses the cycle annealing process, a procedure in which time-temperature program control is used for the annealing of steel forgings and other parts. Metallurgical background and process equipment for cycle annealing and radiant tube-fired and direct-fired installations are described. Annealing treatments for typical steels are presented together with their chemical compositions, hardness values obtained, and the time-temperature curves.

M. J. CROSE MANUFACTURING CO. INC., Box 3368 Whittier Station, Tulsa 8 —Copies of this 70-page catalog of pipeline equipment, materials, and supplies are now available. The company's specialized equipment such as pipe cleaning and priming machines, pipe coating and wrapping machines, tar heating kettles, Vitron glass wrapper, internal lineup clamps, and beveling machines is illustrated. Also included is a section of data on coating and wrapping materials, mileage, and quantity.

DY-CHEK CO., division of Northrop Aircraft Inc., 1515 E. Broadway, Hawthorne, Calif.—"Inspection Clinic" monthly letters have been established to provide an interchange of technical information about Dy-Chek, the dye penetrant method of inspection. The current letter is labeled Bulletin 503.

WHEELCO INSTRUMENTS CO., 847 W. Harrison St., Chicago 7—The 1950 edition of the Wheelco Data Book and Catalog, bulletin TC-8, contains up-to-date prices, application recommendations, and pertinent information on instrument sensing units and accessories. Copies are available upon request.

HANDY & HARMAN, 82 Fulton St., New York 7, N. Y.—Bulletin 20 discusses low temperature silver alloy brazing with Easy-Flo and Sil-Fos, telling where and how to use these alloys to best advantage. Applications are illustrated and fast brazing techniques described.

TIMKEN SILENT AUTOMATIC DIVISION, The Timken-Detroit Axle Co., Jackson, Mich. — New publications include AD 725 on furnaces for winter air conditioning, AD 726 on conversion gas burners, AD 731 on gas furnaces, and AD 781 and AD 789 on gas boilers.

MINNEAPOLIS-HONEYWELL REGULATOR CO., 2753 Fourth Ave. S., Minneapolis 8—"Heating Control Handbook for the Installer and Service Man" is an 88-page publication discussing oil burner, gas burner and stoker controls. Designated SA 1399-3

MORRISON STEEL PRODUCTS INC. 601 Amherst St., Buffalo, N.Y.—Two new bulletins, 50-8-A and 50-9-A, include photographs, specifications, and general information on the company's Mor-Sun Utility and Gravity furnaces.

CALENDAR

JANUARY 1951

AGA Home Service Workshop—Hotel Statler, Washington, D. C., Jan. 3-5.

Pipe Line Contractors Assn. Annual Convention—Shamrock hotel, Houston, Jan. 9-10.

American Society of Heating & Ventilating Engineers—Philadelphia, Jan. 22-25.

MARCH

Mid-West Gas Assn.—Hotel Fontenelle, Omaha, March 12-14.

National Assn. of Corrosion Engineers Conference & Exhibition—Hotel Statler, New York, March 13-16.

Western Metal Congress & Exposition—Civic auditorium and Exposition hall, Oakland, Calif., March 19-23.

New England Gas Assn. Annual Meeting—Hotel Statler, Boston, March 29-30.

APRIL

AGA Sales Conference on Industrial & Commercial Gas — Shoreham hotel, Washington, D.C., April 2-4.

Mid-West Regional Gas Sales Conference, Residential Gas Section—Edgewater Beach hotel, Chicago, April 9-11.

Southwestern Gas Measurement Short Course—University of Oklahoma, Norman, April 10-12.

AGA Distribution, Motor Vehicle, and Corrosion Conference—Hotel Peabody, Memphis, April 16-18.

Gas Appliance Manufacturers Assn. Annual Meeting—The Drake hotel, Chicago, April 16-18.

Florida - Georgia Gas Assn. Spring Convention — Hollywood Beach hotel, Hollywood Beach, Fla., April 19-21.

Southern Gas Assn. Annual Meeting—Biloxi, April 23-25.

National Conference of Electric and Gas Utility Accountants—Hotel Sherman, Chicago, April 23-25.

Indiana Gas Assn. — French Lick Springs, French Lick, Ind., April 26-27.

MAY

AGA Natural Gas Department Spring Meeting—Baker hotel, Dallas, May 7-8.

Missouri Assn. of Public Utilities—Jefferson hotel, St. Louis, May 7-9.

National Resturant Exposition—Navy Pier, Chicago, May 7-11.

AGA Production and Chemical Conference—Hotel New Yorker, New York, May 14-16.

AGA Industrial and Commercial Gas Section Industrial Gas School—William Penn hotel, Pittsburgh, May 14-18.

Pennsylvania Gas Assn.—Wernersville, Pa., May 15-17.

Public Utilities Advertising Assn. Convention—Hotel New Yorker, New York, May 17-19.

JUNE

Institute of Cooking and Heating Appliance Manufacturers Annual Meeting—Cincinnati, June 5-6.

AGA Executive Conference—Greenbrier hotel, White Sulphur Springs, W. Va., June 11-12.

Canadian Gas Assn.—Bigwin Inn, Lake of Bays, Ontario, Canada, June 18-21.

Michigan Gas Assn.—Grand hotel, Mackinac Island, Mich., June 25-26.

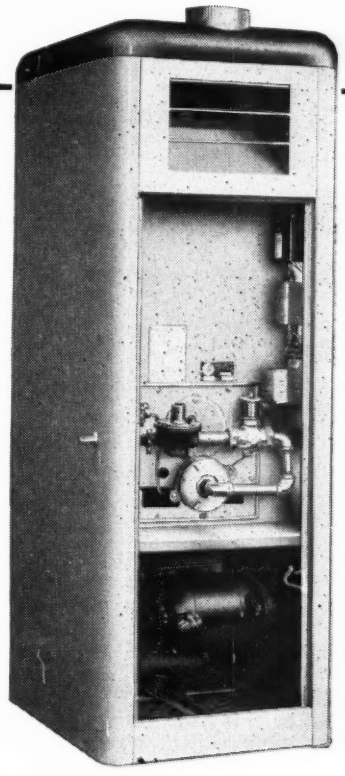
SEPTEMBER

Pacific Coast Gas Assn. Annual Convention — Fairmont hotel, San Francisco, Sept. 4-6.

OCTOBER

AGA Annual Convention—St. Louis, Oct. 15-18.

LOW or HI-BOY...



This remarkable new

SECURITY

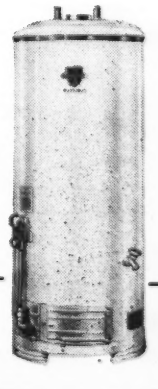
MODEL SFA FURNACE

handles any forced air problem!

Security leads the trend to compact efficiency with the new SFA Series. Adaptable to every domestic winter air conditioner situation. Versatile enough for conventional, basementless or utility room installations. Completely engineered for effortless, automatic heating. Yes, sir . . . the SFA brings greater economy and longer life to home heating!

Only Two Connections Necessary

Completely assembled at factory. Hook up just one gas and one power line! Filter racks optional at bottom, right or left. Each control can be removed without disturbing other wiring. You'll be amazed at its versatility. Available for all gases. Write or wire now for complete information, prices.



SECURITY

SECURITY MANUFACTURING CO.

1630 Oakland St. • Kansas City 3, Mo.

Also manufacture the famous Security Heavy Duty Water Heater and full Line of Gravity, All-Purpose, and In A Wall Furnaces and Conversion Burners.

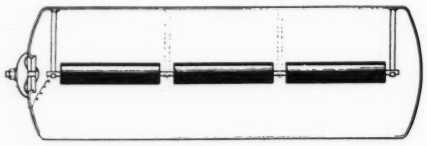
NEW PRODUCTS

Anodes

THE CLEVELAND HEATER CO., Elno Division, 2310 Superior Ave., Cleveland 14, Ohio.

MODEL: Three-inch Elno.

DESCRIPTION: After 2½ years of pilot tests, this company has extended anodic tank protection to large volume storage tanks up to 2000 gals. in capacity with jumbo-sized 3-in. Elno anodes. Made up from basic sections 21 in. long, the units are coupled together to form multi-section anodes in whatever combination of unit sections and half sections comes closest to the length of the tank being protected. Depending upon its size, one or more of these multi-section Elno anodes are used in a tank truck. Two methods of installing the anodes are used. If the tank has a manhole, the anodes can be



mounted on hangers suspended inside the tank. If it does not have a manhole, 3-in. tappings must be provided in either head of the tank and the anodes are furnished with 3-in. plugs.

Anchorgas

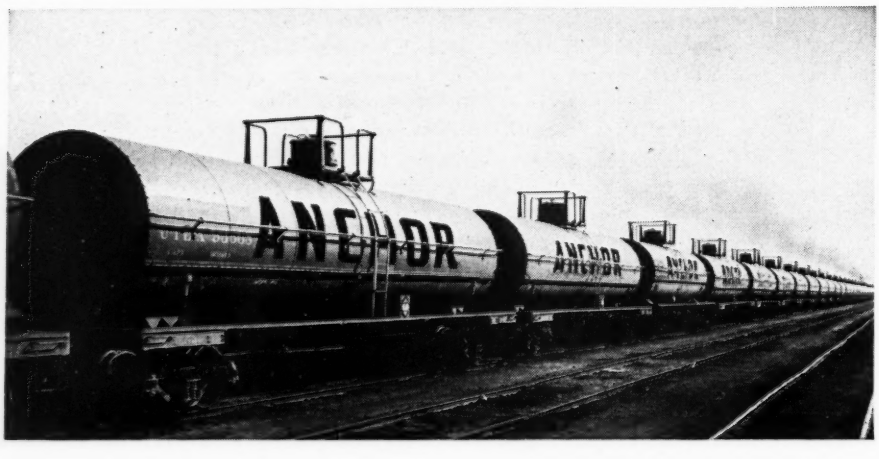
Butane-Propane for Stand-by Plants and Peak-Load Requirements

From our strategically-located plants we are able to give quick delivery on high-quality ANCHORGAS, Butane-Propane. Shipments by rail, water or transport. For dependable gas service, call us before you renew your contract. Ask about Anchor's contract plan.

call anchor first

ANCHOR PETROLEUM CO.

ATLAS LIFE BUILDING—TULSA, OKLA.



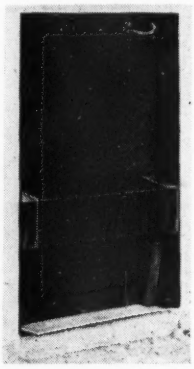
LP-Gas Compound

I. H. GRANCELL, 1601 Nadeau St., Los Angeles 1.

MODEL: Bestolife Lead seal No. 960 for use with liquid petroleum.

DESCRIPTION: This compound is used as a joint compound in sealing, fitting, and mating of engaged threads. It relieves friction, seizure, and galling of mated surfaces, facilitates assembly of parts, and prevents freezing of joints. It may be used on compression type fittings in making press fits or metal-to-metal fits, and on threads. Packaged in 5-, 20-, and 50-lb containers.

Heating System



COPPERHEAT INDUSTRIES INC., Detroit 21, Mich.

MODEL: Copperheat.

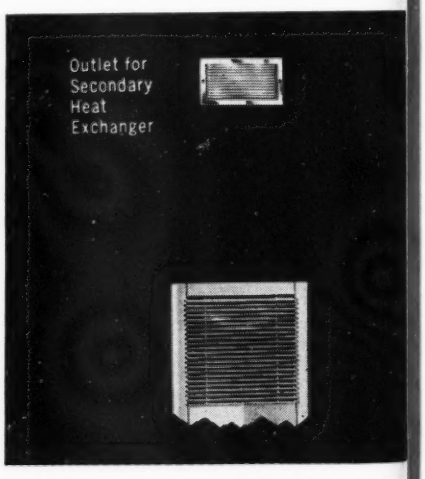
DESCRIPTION: In this hot water heating system a circulating pump is attached to the gas or oil-fired boiler. When thermostat is turned up, hot water is pushed at 10 ft/second through ¾-in. copper tubing. Radiators, called Wallrads, have individual small blowers with both thermostatic and manual control. It is claimed that the system will give heat faster from a cold start than any other system.

Recessed Wall Heater

HOLLY MANUFACTURING CO., 875 S. Arroyo Parkway, Pasadena 2, Calif.

MODEL: NarroWall.

DESCRIPTION: The manufacturer claims that its exclusive "secondary heat exchanger," which saves heat otherwise lost through the flue, makes possible the circulation of 25% more warm air per Btu input. This "plus



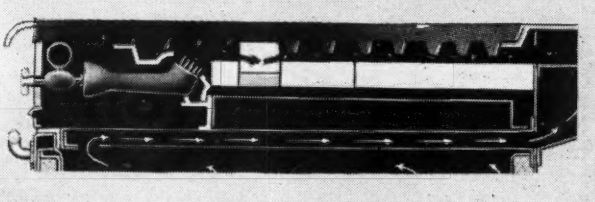
heat" is said to be one-tenth of the total heat output. The floor-to-ceiling NarroWalls are AGA tested and approved for use within 2 in. 4-in. walls covered with lath and plaster, wood panels, wall board, or other combustible materials. Single or dual models are available with 25,000 and 35,000 Btu inputs; dual model with 45,000 Btu input.

1 ★ 2 ★ 3 ★ 4 ★ 5 ★ 6 ★ 7

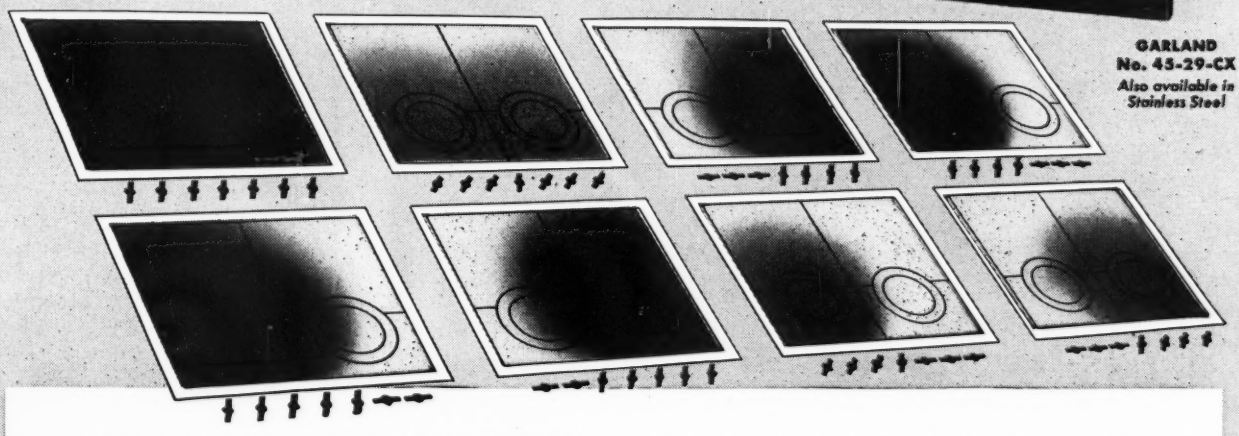
Front Fired Burners Give Unequaled Top Heat Flexibility! ONLY

GARLAND

the leader Has This Feature



GARLAND
No. 45-29-CX
Also available in Stainless Steel



GREATEST FEATURE ON ANY HEAVY DUTY GAS RANGE! *Seven front fired burners* that distribute controlled heat to every part of the cooking top! *Seven front fired burners* that permit an infinite number of heat variations all over the hot top.

Yes, Garland—and *only* Garland—has this great feature! Garland is the most flexible, the most practical of all Heavy Duty gas ranges!

Think of the time saved—think how *much faster,* how *much better* the chef can prepare meals when he has the right degree of heat when he wants it, *where* he wants it.

And remember: this is only one of the many big features that make Garland the leader in sales, the leader in value! So before you buy, see your Garland dealer! Compare! Your choice will be *Garland!*

AMERICAN SOCIETY OF INDUSTRIAL ENGINEERS — MERIT AWARD

ALL Garland units are available in Stainless Steel and equipped for use with manufactured, natural or L-P gases.

GARLAND*

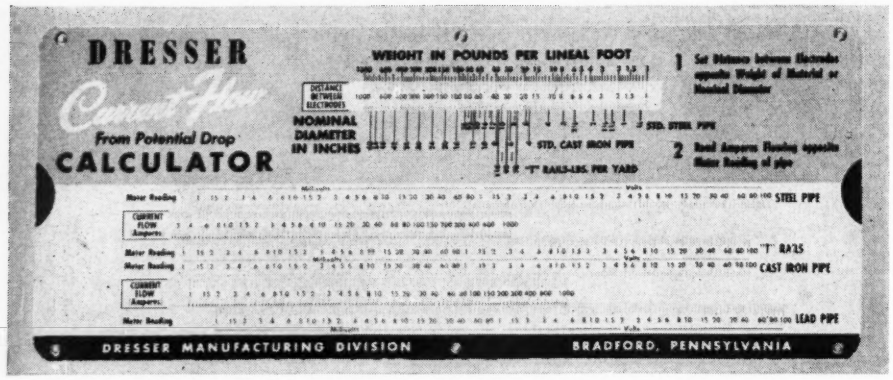
THE TREND IS TO GAS

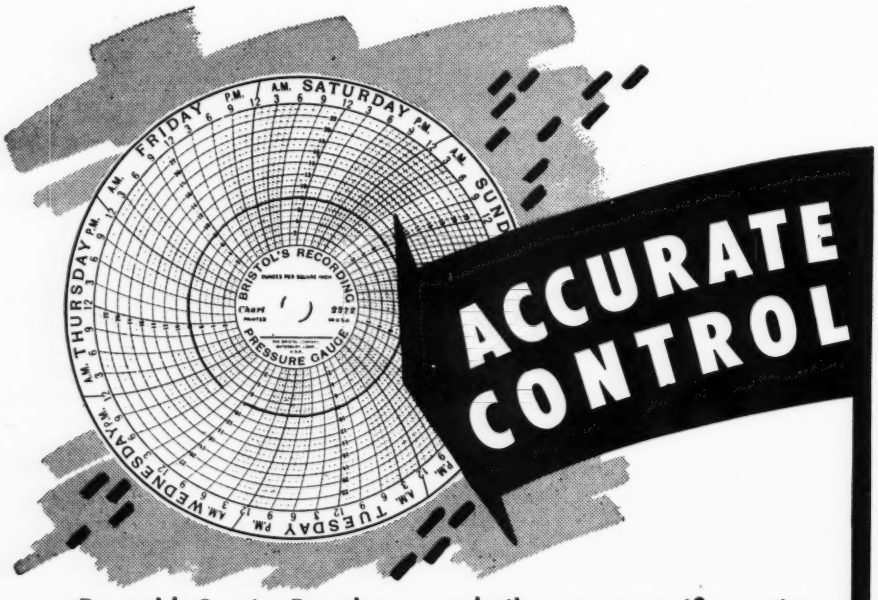
FOR ALL COMMERCIAL COOKING

Heavy Duty Ranges • Restaurant Ranges • Dinette Ranges • Broilers • Deep Fat Fryers
Toasters • Roasting Ovens • Griddles • Counter Griddles

PRODUCTS OF DETROIT-MICHIGAN STOVE CO., DETROIT 31, MICHIGAN

*REG. U. S. PAT. OFF.





Reynolds Service Regulators are built to meet specific requirements—years of operation in the field through a complete range of operating conditions have proved not only their superiority but their durability. With parts so precisely machined for each model that they are completely interchangeable. The accuracy you require in performance is assured.

MODEL 10

Dead Weight or Spring Type, with or without Mercury Seal, or Dead Weight Safety Seal or diaphragm operated relief valve. All working parts are so accessible as to be interchangeable without removal from pipe line.

MODEL 20

Dead Weight or Spring Type, with or without Mercury Seal, or Dead Weight Safety Seal or diaphragm operated relief valve. All working parts are so accurate as to permit complete interchangeability in shop.

MODEL 30

For horizontal or vertical connections, with or without removable valve pocket. Available with either Spring or Dead Weight adjustment. With or without Mercury or Dead Weight Safety Seal or diaphragm operated relief valve.

Reynolds Gas Regulator Co.
ANDERSON, INDIANA, U. S. A.
GAS CONTROL SINCE 1892

Flow Calculator

DRESSER MANUFACTURING DIVISION, Bradford, Pa.

MODEL: Current flow calculator.

DESCRIPTION: This slide rule will estimate current flow from potential drip readings on steel, cast iron, and lead pipe and T-rails, and it is sufficiently accurate to use while making electrolysis surveys in the field. It was developed by Paul F. Marx, corrosion engineer, and the company will supply one, free of charge, to any corrosion engineer associated with a gas utility or pipeline company.

As an example, if a 4-in. nominal diameter steel pipe (4½-in. OD) is under test and the electrodes or test leads are 75 ft apart and the meter reading is 6 millivolts, to obtain the amount of current flowing on this pipe, it is necessary to set the distance between electrodes (75 ft), over 4-in. standard steel pipe. Then directly under 6 millivolts on the steel pipe scale may be read the answer: 4 amperes flowing on the pipe.

Fan Circulating Heater

BRYANT HEATER DIVISION, Affiliated Gas Equipment Inc., 17825 St. Clair Ave., Cleveland 10, Ohio.

MODEL: No. 428.

DESCRIPTION: A patented radiant diffuser

of concentric louvers permits the use of a propeller type fan to give draftless circulation, the manufacturer states. The unit also has a cast iron vertical heat exchanger with concentric passages which conform to the air pattern from the fan.

Currently manufactured in one size—65,000 Btu per hour input—the heater is AGA-approved for natural, mixed, manufactured, and LP-Gas.

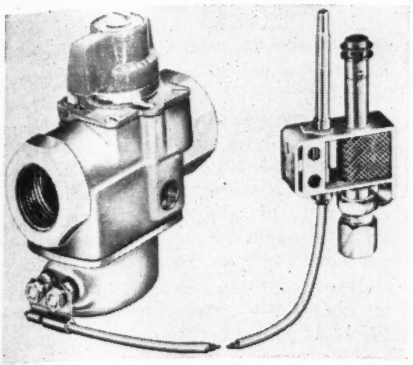
Safety Valve and Pilot

GENERAL CONTROLS CO., 801 Allen Ave., Glendale 1, Calif.

MODEL: MR-5 gas cock safety valve and 260 series pilot burner.

DESCRIPTION: This new pilot burner is designed on a smaller scale than its predecessors. It incorporates a removable filter screen that assists in eliminating the nuisance of lint plugging. The special mounting bracket, designed for various types of appliance installation, holds both the burner and

the thermocouple in secure operating relation to each other. The ¾-in. valve features 100% safety shut-off. The plastic, manual



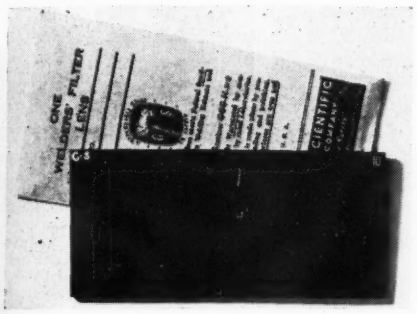
reset handle may be removed to expose a rod fitting device for use with floor furnace installations.

Welding Plate

GENERAL SCIENTIFIC EQUIPMENT CO., 2700 W. Huntington St., Philadelphia 32.

MODEL: G-S welding plates.

DESCRIPTION: These welding plates have been developed as a result of scientific research to filter out harmful ultraviolet and



infrared rays present in electric welding. They are graded for density of shade and thickness in accordance with U.S. federal specifications for welding helmets and shields. Standard size is 2 x 4¼ in., also available in 2 x 4⅛-in. size. G-S plates are guaranteed to absorb 99.5% or more infrared and 99.75% or more ultraviolet.

Other New Developments

A 2-bu capacity home garbage and trash burning unit, Incinor Model S-25, has been approved by the AGA Laboratories and is in production at the Cairo, Ill. plant of Bowser Inc. The automatic gas-fired unit is equipped with a thermo-magnetic valve and Time-O-Gas control which permits selection of the firing time and turns off the gas automatically when the time has expired . . . M. C. Miller, 1142 Emerson Ave., West Englewood, N. J. is marketing a Multi-Combination meter, the B-3, for electrolysis, corrosion, and cathodic-protection testing. It is small and compact although it has a low range of 2 millivolts and special mirror scales 3.9 in. long. Accuracy is claimed to be 1% . . .

Taco Sweat Check is a new flow valve, installed with sweat or solder type connection, designed to prevent hot boiler water from flowing to the heating system when the circulator is not running, thereby permitting the boiler to be used for domestic hot water heating all year. This bronze valve is made only in 1-in. size by Taco Heaters Inc., 137 S. St., Providence, R. I. . . . Making lateral pipe connections to branch and main pipelines is said to be simplified by a single-strap clamp which makes use of special molded rubber and oil-resistant gaskets to effect a leak-proof seal. "Taper sealing" is the name applied to this development by the manufacturer, Smith-Blair Inc., South San Francisco Calif. . . .

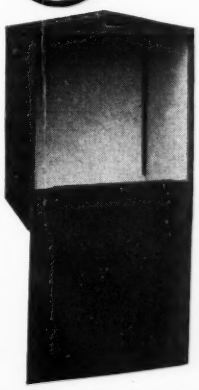
Two improvements in its No. 3000 top oiler for gas and gasoline engines have been announced by Universal Lubricating Systems Inc., 779 Allegheny Ave., Oakmont, Pa. The first is an air filter which is assembled as an integral part of the unit and prevents road and field dust from contaminating the oil in the container. The second is a design change to assure a uniform rate of oil flow regardless of the oil level in the container . . .

Crawford Fitting Co., Cleveland, Ohio claims that bothersome small leaks are eliminated by the use of its Swagelok fittings which provide a vacuum tight seal. They will hold heavy or thin wall tubing equally well and are available in brass, monel, aluminum, steel, and stainless steel in a range of sizes for use with ⅛ to 1-in. OD tubing . . .

For replacement use in basementless houses, A. O. Smith Corp., Kankakee, Ill. is marketing a small-diameter, lower-priced Permaglas automatic water heater. Named the "Rancho," the heater is made in 20- and 30-gal. sizes and fits into spaces as small as 18¼ in. square and 5 ft high . . .

Protect Your Meter Investment with a **METER HOUSE**

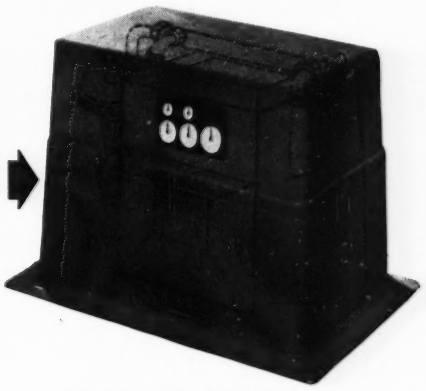
INDUSTRIAL METER HOUSE



for orifice meters, recording, thermometers, D P cells, etc. Steel construction, insulated against weather. Baked auto enamel finish.

Size: width 21", depth 15", height 26".

ZENALOY METER HOUSE



A protective and decorative cover for residential installations made of molded Fiberglas construction. Impervious to all weather and soil conditions. Will not rust or warp. Light, strong and easy to install.

Size: width 27", depth 18½", height 22".

"TILTBACK" ORIFICE METER HOUSE

for all types of orifice meter installations, convenient for making repairs or calibrating meters. Fabricated from 22 gauge sheet metal. Weight approximately 50 lbs. Easily assembled.

Size: width 26", depth 16", height 32".

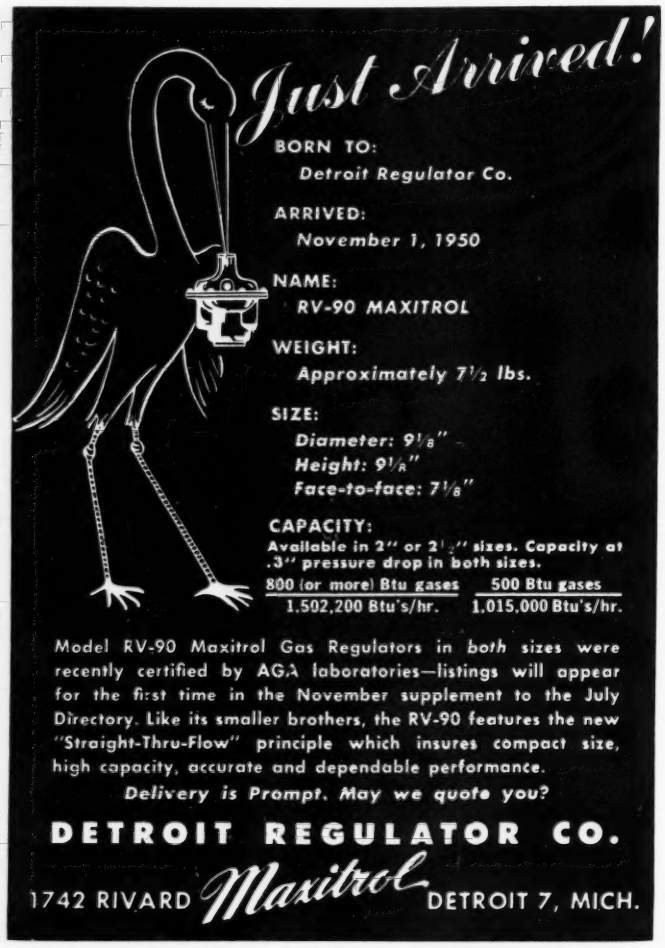
(Special houses made to your specifications)

GORDON Z. GREENE CO.

Manufacturers of Oil & Gas Specialties

2335 East Eighth St., Los Angeles 21, Calif. TUcker 1279

Information concerning Insulating Bushings & Nipples, Plastic Tubing, Commercial Type "CN" Orifice Fittings, Leveling Saddle, Bored & Calibrated Meter Runs and Straightening Vanes.


Just Arrived!
BORN TO:
Detroit Regulator Co.
ARRIVED:
November 1, 1950
NAME:
RV-90 MAXITROL
WEIGHT:
Approximately 7½ lbs.
SIZE:
Diameter: 9⅛"
Height: 9⅛"
Face-to-face: 7⅛"
CAPACITY:
Available in 2" or 2½" sizes. Capacity at .3" pressure drop in both sizes.
800 (or more) Btu gases 1,502,200 Btu's/hr.
500 Btu gases 1,015,000 Btu's/hr.
Model RV-90 Maxitrol Gas Regulators in both sizes were recently certified by AGA laboratories—listings will appear for the first time in the November supplement to the July Directory. Like its smaller brothers, the RV-90 features the new "Straight-Thru-Flow" principle which insures compact size, high capacity, accurate and dependable performance.
Delivery is Prompt. May we quote you?
DETROIT REGULATOR CO.
1742 RIVARD Maxitrol DETROIT 7, MICH.

A BEAUTY . . . AND THE BEST IN
Peerless
GAS
UNIT HEATERS
A COMPLETE UNIT
IN ONE
PACKAGE
QUIET FORCED AIR
meet the most exacting demands for efficiency . . . quiet operation . . . attractiveness . . . low in height and priced to Sell.
Peerless Gas Unit Heaters are shipped from factory ready for power and gas supply. All gas controls and internal wiring completed.
Write today for new literature
EASY TO SELL
EASY TO INSTALL
THEY'RE STYLED FOR BEAUTY
BUILT FOR DUTY
AVAILABLE IN FIVE SIZES
A.G.A. APPROVED FOR ALL GASES
PEERLESS MANUFACTURING CORP, LOUISVILLE 10, KY.

CURRENT READING

GAS PRODUCERS AND BLAST FURNACES—by Wilhelm Gumz. Published by John Wiley & Sons Inc., 440 Fourth Ave., New York 16. A comprehensive development of the mechanism of the gasification process, this book provides a general calculation method that solves the major part of all problems connected with the complete gasification of carbon. Describing methods for calculating the design of synthesis gas producers that have been found reliable by German engineers, Mr. Gumz extends these methods to other types of industrial furnaces. Price: $7.

TEMPERATURE ENTROPY CHART of Thermodynamic Properties of Nitrogen—by E. S. Burnett. This Report of Investigations 4729 may be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13. The chart has been prepared from data obtained at the bureau's cryogenic laboratory during the past 25 years. An extensive bibliography is included.

GAS FUNDAMENTALS — Published by Koppers Co. Inc., Pittsburgh. A limited edition of this compilation of basic gas facts "needed for evaluation of problems facing the gas industry today" has been printed and distributed to several thousand gas industry executives. The 63-page book is not available for general distribution.

CONDENSATION IN GAS WATER HEATERS — Research Bulletin 58, AGA Laboratories, is a report on Project DGR-6-WH sponsored as a PAR activity by the committee on domestic gas research.

Considerable research has been devoted to the design of gas-fired water heaters for insuring maximum hot water delivery and maximum service efficiency, but little attention has been directed to the factors that will eliminate or minimize the condensation that occurs in these appliances. In many instances cut and fill methods have been employed to combat the condensation problem in the field; but until very recently, there has been little published information of a fundamental nature available for guidance. Consequently, it was believed that a study of factors influencing condensation of water vapor from flue gases on metal surfaces would lead to a method or methods for mitigating this difficulty in contemporary water heaters without impairing performance.

This bulletin reports results of a study of the effect of metals and surfaces on condensation of water vapor from flue gases, a resumé of factors contributing to condensation in gas water heaters, and suggestions for reducing condensate formation.

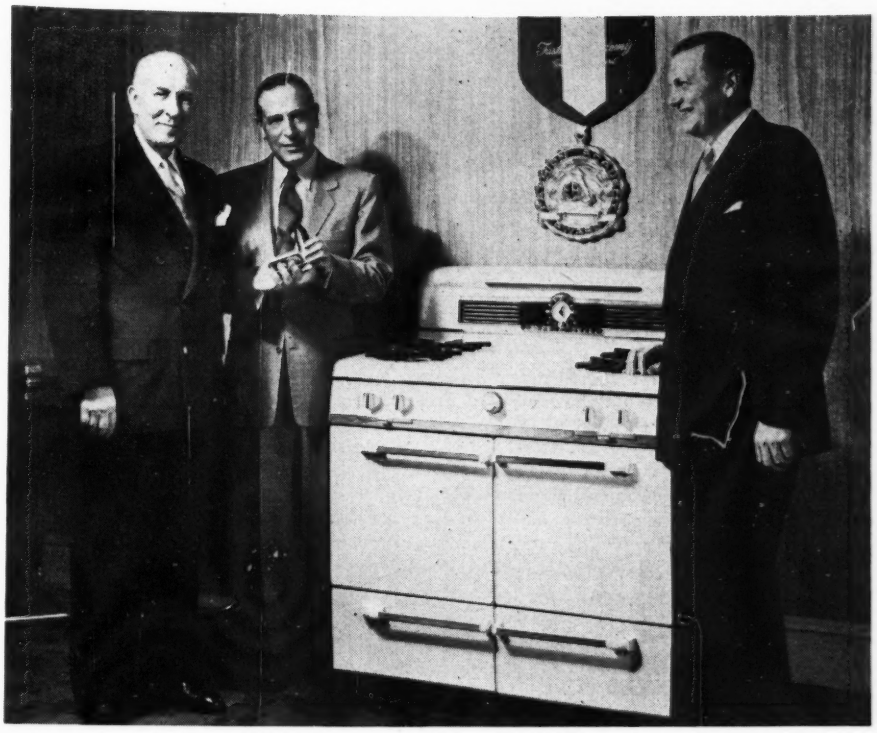
Original data presented and analyzed in this bulletin indicate that for all practical purposes the type of metal usually employed and the emissivity of its surface have no effect on the rate of condensation of water vapor from flue gases. On the other hand, the presence of sulfur in a fuel gas raises the dew point temperature of the flue gases and increases the formation rate of condensate on metal surfaces.

Data are also presented and discussed on the effect of type and emissivity of a metal

surface and condition of such surfaces on the water side on the rate of transferring heat to still water and on the rate of condensate elimination. These data indicate that rate of transferring heat to water and rate of condensate elimination are greater for dropwise condensation than for filmwise condensation. Heat transfer and rate of condensate elimination are also increased by changing a metal surface from a reflecting condition to a black body condition. Increasing thermal resistance such as by scale formation on the water side of a metal results in a decrease in heat transfer and no significant change in the rate of condensate disappearance.

A resumé is made of published information on factors affecting the condensation of moisture from flue gases, and from a detailed search of the literature an evaluation is made of design factors that influence the extent to which condensation occurs in gas-fired storage water heaters. These design factors are area of condensing surface exposed to flue gases, methods of introducing cold inlet water, and recovery capacity of the heater. Other factors discussed which affect the extent to which condensation occurs in a water heater are dew point of flue gases and tempering of inlet water.

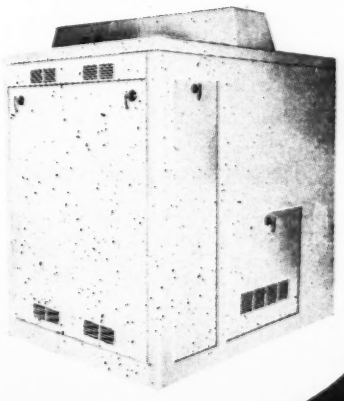
A review is made of the known methods in use for minimizing condensation and reducing its undesirable effects. New suggestions are also presented for minimizing condensation based on an analysis of the experimental results and the study of design factors affecting this problem. Recommendation is made that any future development work on this subject be left to the ingenuity of appliance manufacturers.



Presentation Dec. 15 of the 1951 New York Fashion Academy award to Detroit-Michigan Stove Co. for "distinguished design and superior styling" of the new line of Detroit Jewel and Garland gas ranges found (left to right) John A. Fry, president; Emil Hartman, director of the academy and well-known fashion analyst; and Fred A. Kaiser, vice president, grouped around one of the firm's 1951 models. It marked the first time that the academy's Gold Medal had ever been bestowed upon a cooking appliance.

Bottling, Brewing, Dairy Plants
All Need Evans Heating Units!

• EVERY gas representative should KNOW that the Evans Automatic Heating Unit is the answer to the problem of heating caustic solutions for bottle washing machines. The old expensive and troublesome boiler has been supplanted by the Evans Unit! You just light this unit and forget it! Operates AUTOMATICALLY with a tremendous saving in fuel, time, bottles and insurance. Write us for full details.



G. C. EVANS SALES COMPANY
LITTLE ROCK, ARKANSAS

EVANS
• • • • • AUTOMATIC HEATING UNITS • • • • •

These new all-gas homes in Oklahoma are the result of close cooperation between gas utilities and architects. This combined effort helps overcome the handicap of non-merchandising policies in the state.

NORWALK MANOMETERS

For Water, Mercury, Oil or Glycerine

MODEL "A" SERVICE TYPE Ideal for Serviceman's Kit

MODEL "B" HEAVY DUTY TYPE

MADE IN ALL SIZES and TYPES

For pressure or vacuum use. Service Type has unbreakable tubing and will stand abuse. Send for bulletin 3100M for complete data and prices.

NORWALK VALVE COMPANY
South Norwalk, Conn.

Manufacturers of
NORWALK-CONNELLY REGULATORS
Since 1878

No selling, but . . .

Home Planning Aid Keeps Oklahoma Homes "All-Gas"

ALTHOUGH gas utilities in Oklahoma do not merchandise appliances, they are encouraging up-grading of such installations and are receiving fine cooperation from most dealers, architects, and builders.

A pioneer in establishing such relations is Zenith Gas System Inc., of Alva, which has transmission and distribution systems at Alva, Woodward, Waynoka, Mooreland, Avard, and other towns in northwestern Oklahoma and at Hardtner, Kan. Population of the towns ranges from about 15,000 down. There are few architects or big-scale home building firms in that area.

Twenty-four years ago this utility employed an engineer who could draw plans for gas installations in residences, commercial, and industrial buildings. He worked in conjunction with the home demonstration and service departments and let it be known that the company was willing to supply, free of charge, helpful suggestions to anyone planning to install gas service or to construct buildings in which natural gas was to be used. Prospective property owners who wanted to buy new homes as well as builders were invited to come to the offices of the utility and consult with it as to best types of appliances, arrangements of space, and other details relating to the most economical use of gas for the purposes intended.

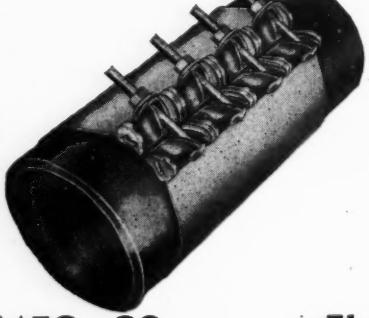
"The invitation was not generally accepted at first," observed President W. L. Woodward, "but confidence in it spread gradually as our people were convinced that we had no axes to grind and were interested only in securing installation of gas appliances and equipment of standard quality and efficiency which would assure our customers the most satisfactory and efficient utilization of gas. We were careful to show no favoritism among manufacturers, dealers, or builders.

"When these general standards were accepted we dropped around occasionally at the site of installations and offered suggestions if necessary. Our company then saw to it that these installations were satisfactory without additional cost to the consumer," Mr. Woodward explained. "We now have the confidence of everyone in our communities who uses gas and almost everyone consults us before selecting equipment or having new homes and other buildings constructed. It is not unusual for housewives to visit our offices and draw rough plans of what they would like to have in the way of arrangement of gas appliances in their new homes. This gives us a good opportunity to be helpful to them in selecting types of equipment which would best meet their needs and the arrangement best suited to conserve space, consistent with their needs."

Another utility serving a larger territory, the Oklahoma Natural Gas Co., Tulsa, has very successfully adapted the AGA Manual for Architects to its cooperative program. In Oklahoma City and Tulsa where it has its largest natural gas distribution systems, several thousand new homes and other buildings have been constructed each year since 1946. During this time the utility has distributed these manuals to most of the architects in these cities. Most of the big residential developments have their own architects. The principal difficulty here is to get around to everybody and to contact them before plans are made or buildings started.

THE FAST AND EASY WAY!

STAUFFER PIPE REPAIR CLAMPS



to **Permanent** PIPE REPAIR

STAUFFER MFG. CO. **El Monte, Calif.**

Irrepressible Lionel Barrymore, a star of the traditional Christmas Eve broadcast of Dickens' "A Christmas Carol," reads a passage from the script to H. L. Bilsborough of A. O. Smith Corp., sponsor of the 1950 program, broadcast Dec. 24 over 527 Mutual Broadcasting System stations.

ASSOCIATIONS

Last Month

Mid-Southeastern Elects Barnes President

Gasmen were busy electing and selecting last month.

In Raleigh, N. C., in the heart of one of the new natural gas frontiers, the Mid-Southeastern Gas Assn. met to learn more about conversions, gas heat, and development of the industrial load. It was the young association's 12th annual meeting, and time for choosing new officers.

A. F. Cassidy

J. D. Barnes, Piedmont Gas Co., Hickory, N. C., was named president; W. K. Nussbaum, Savannah (Ga.) Gas Co., first vice president; Charles M. Stone, Duke Power Co., Charlotte, N. C., second vice president; J. Z. Watkins, Rulane Gas Co., Charlotte, and V. D. Bradley, Lynchburg (Va.) Gas Co., directors; and E. W. Ruggles, Raleigh, secretary-treasurer. Eugene Leier, Columbia, S. C., retired as president.

In Tulsa, at the annual meeting of the Oklahoma Utilities Assn. Dec. 14, C. N. Robinson, vice president of the Public Service Co. of Oklahoma, headed a newly installed slate. Vice presidents chosen were Richard Camp and W. R. Wolfe, both of Oklahoma City. H. H. Ferrin, Oklahoma City, was named treasurer, and Miss Kate Niblack was returned to her post as secretary.

Twelve directors were elected. D. W. Reeves, now with the Public Service Co. of New Mexico, was the outgoing president.

GAMA's water heater division elected A. F. Cassidy, manager of the water heater sales division, Rheem Manufacturing Co., to the chairmanship of its gas water heater division. Mr. Cassidy, who succeeds Leland Feigel of Servel, was formerly with Consolidated Edison Co. of New York.

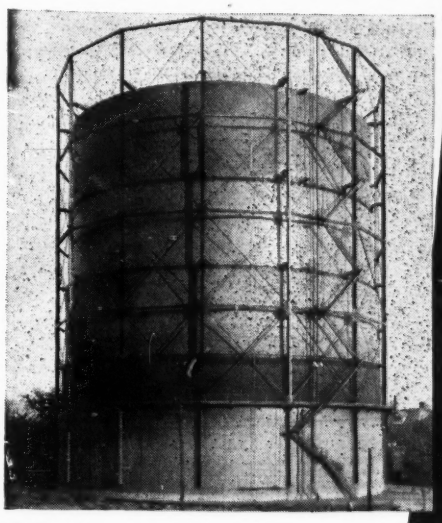
Meanwhile another Servel man was assuming a GAMA post — D. R. Meckstroth, director of sales research for the company, who was named chairman of the general marketing committee. L. O. Reese, Armstrong Products Corp., Huntington, W. Va., succeeded Mr. Meckstroth as vice chairman.

D. S. Sargent

D. R. Meckstroth

STAMANCO

A TRADE NAME THAT STANDS FOR



SPECIALIZED EXPERIENCE
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LEADERSHIP IN DESIGN
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HIGHEST QUALITY WORKMANSHIP
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OUTSTANDING SERVICE
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DEPENDABLE PERFORMANCE
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Let us figure on your requirements.

The STACEY MANUFACTURING Co.
SINCE 1851
CINCINNATI 16, OHIO

GAS HOLDERS • HI-PRESSURE TANKS • PURIFIER BOXES

ENGINEERS • FABRICATORS • CONSTRUCTORS

An Independent Organization Not Affiliated With Any Other Builders of Gas Holders

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NAME_____ POSITION_____

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FOR SALE: APPROX. 340 #1 TOBEY; 21 #2 Tobey; 650 #1 Ironclad; 2 #2 Ironclad; 2 #1 Emco Gas Meters. Serviced and ready for immediate use. Write for prices to Bond County Gas Co., Greenville, Illinois.

DEPENDABLE L-P GAS

FUEL SUPPLY
EQUIPMENT
ENGINEERING
CONSULTING SERVICE

UNITED PETROLEUM GAS COMPANY
806 Andrus Building • Minneapolis 2, Minnesota

M-SCOPE PIPE FINDER

MODEL AB
ONE MAN OPERATION
METAL CABINETS
HEAVY DUTY PERFORMANCE
ONLY
$149.50

FISHER RESEARCH LAB., Inc.
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Contractors • Engineers • Consultants

LP-GAS SPECIALISTS

H. EMERSON THOMAS & ASSOCIATES, INC.
P. O. BOX 270, WESTFIELD, N. J.
TEL. 2-2800

Experience • Service • Reliability

Over at AGA, President D. A. Hulcy named Dwight S. Sargent, Consolidated Edison Co. of New York, chairman of the personnel committee and Robert W. Otto, president of Laclede Gas Co., St. Louis, chairman of the general convention committee for 1951. The 10-man committee will meet in St. Louis in January to start formulating plans.

New chairman of the American Chemical Society's division of gas and fuel chemistry is Dr. Arthur A. Orning of the Carnegie Institute of Technology, who took the office Jan. 1 in succeeding Dr. R. E. Brewer of the U. S. Bureau of Mines.

This Month

Home Service, SCMA Top Light Calendar

There'll be no bowl games for the ladies of the gas industry this month, except those directly connected with home cookery.

The second working day after New Year's day—Jan. 3—they are gathering at Washington's (D. C.) Statler hotel and the Washington Gas Light Co. for the annual three-day home service workshop, a January fixture.

As usual a wealth of practical working information is being put forth in talks and demonstrations, this time under the direction of the new AGA committee chairman, Vivian Marshall of New Orleans Public Service Inc., and Ruth Sheldon, of the host company.

A parade of big names in the gas industry will make its way to the podium — AGA President D. A. Hulcy, A. W. Conover, president of Equitable Gas Co., Pittsburgh; Carl W. Horne, Alabama Gas Corp., Birmingham; and E. J. Boothby, president of Washington Gas Light.

Special program emphasis is being placed on training, cooking school techniques, and new homemaking techniques.

Across the nation—in Downey, Calif.—members of the Southern California Meter Assn. will gather January 18 to hear a presentation of unusual importance, "Nuclear Energy for Peace and War." With Dr. Albert W. Bellamy, professor of zoology at the University of California, as speaker, the talk and movies programmed will discuss biological response in relation to civil defense planning and public instrumentation.

"Man and his Relationship to Air" is the theme of a symposium featuring the annual meeting of the American Society of Heating and Ventilating Engineers in Philadelphia Jan. 22-25.

Coming Up

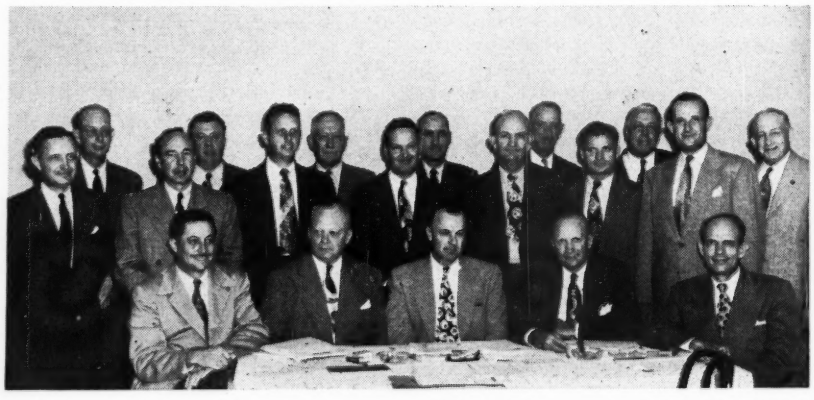
Gas Takes Role in Show

The gas industry will be in the thick of things when the seventh Western Metal Exposition opens for its five-day run in Oakland, Calif. March 19.

Many manufacturers of gas treating equipment and controls are planning exhibits in the city's vast auditorium and exposition hall. Actively promoting the event is the Pacific Coast Gas Assn., perennial exhibitor.

Nearly 100 papers on fabrication, treating and application of metals will be delivered at conferences to be held concurrently.

Another event of top interest in March will be the 1951 conference and exhibition of the National Assn. of Corrosion Engineers at the Statler hotel, New York. Chairmanning the conference committee is L. B. Donavan of Consolidated Edison Co. Advance registrations are being taken.



Planners of the 1951 Southwestern Gas Measurement Short Course gathered in Shreveport recently to iron out details for the April 10-12 meeting. Two items aimed at making the event a smoother operation were agreed upon: first, the organization of an exhibitors' advisory committee of five members; second, a reorganization plan naming a vice chairman for publications and exhibits.

Present at the confab were, from left, seated: T. S. Whitis, Lubbock, Texas; James L. Griffin, Omaha, Neb.; Ben F. Worley, Shreveport; W. H. Carson, Norman, Okla; R. O. Cox, Dallas.

Second row: Roy S. Peace Jr., Birmingham; Walter A. Brewster, Shreveport; R. R. Suttle, Dallas; W. H. Woods, Houston; R. M. Scofield, Dallas; K. R. Tibbets, Tulsa; E. L. Stark, Dallas.

Third row: T. J. Kirkpatrick, Kansas City, Mo.; Dean Bruce, Tulsa; George E. Greiner, Bartlesville, Okla.; M. D. Gilbert, Tulsa; J. H. Satterwhite, Tulsa; George H. Smith, New York; Charles A. Breitung, Austin.

New meets old. With the increasing tempo of new construction, pipeliners are encountering many buried lines. Here, on the Texas Illinois job, begun in 1950 and still under way, engineers run a section from Old Ocean field under a cross line they have uncovered.

FPC Clears Way for Big Pipeline Year

As San Franciscans (see cover) got ready to receive the first shipments of natural gas from Texas, gas pipeliners last month closed the books on another record breaking year and looked ahead to a solid schedule for 1951. The construction of many of the major projects approved by the Federal Power Commission in 1950, aggregating more than $700 million and entailing the laying of 8000 miles of line, was still ahead.

Behind them were the great and glamorous Texas-to-New York line and the San Francisco line, under way were the giant looping project on the Tennessee Gas Transmission mainline and the two new Trunkline and Texas-Illinois lines cutting north through the heart of America, ahead lay the big New England projects.

(A brief description of these projects, as well as all others approved by FPC in the first 11 months of 1950, as compiled by the staff of *GAS*, appears on p. 72. Not included are many lines not as yet certificated, which if approved in early 1951 could easily bring this year's work load past the billion-dollar mark.)

Improving Service

Much of next year's work as now set up will be directed toward improving present service and adding laterals to major trunks already in place and operating. With a number of big inches now carrying billions of cubic feet daily from the rich fields of the Southwest to the midwest, north, and east, many carriers are concentrating on extension of service areas, addition of underground storage pools, and extensive looping jobs. A number of FPC approvals have been in the under $10 million class, which is relatively "minor" in these days of easy superlatives.

The result will be a still greater concentration of natural gas for defense purposes and further relief for shivering householders.

Not Yet a Trend

This activity cannot be termed a trend, however: In 1950 the record of approvals of the big ones was impressive. FPC started things rolling in January with the certification of a $52 million looping job for Northern Natural Gas Co., Omaha, with 597 miles of pipe and 35,200 in compressor horsepower involved in a project to boost capacity by 130 MMcf per day.

In April, Transcontinental's plan to spend $49 million for 134,560 hp in additional compressor capacity was approved. Trunkline's $80 million job, with 740 miles of line and 560 miles of laterals involved, won a nod in May. Southern Natural Gas Co.'s $33 million Gwinville (Miss.) to Aiken (S.C.) trunk was also approved in May. The Texas-Illinois proposition was certificated in June and Michigan Consolidated and Michigan-Wisconsin's joint $38 million compression and storage plan passed FPC tests in July.

More Big Ones

El Paso Natural Gas Co.'s San Juan line, costing $44.5 million and designed to increase deliveries to San Francisco, and Colorado Interstate's $14 million plan to increase service to the Rockies were other highlights of a busy midsummer month.

In early November, the official stamp was placed on two of the year's biggest jobs—the $40 million storage development of Texas Eastern and New York State Natural and the complex Northeastern Gas Transmission Co. plan to serve New England.

Thus the record showed no slowup following the start of war in Korea. Wily gasmen, now well schooled in the art of obtaining steel when the supply is short, were faring relatively well. How they might make out in the future, with its DO's and other limiting factors, is something else again. But with national defense a factor, the increasing industrial importance of natural gas will do the industry no harm.

$700 Million Worth of Pipeline Work Was Certificated in 1950

The following are brief descriptions of projects approved by the Federal Power Commission during the first 11 months of 1950. Some have been completed, some are well under way, others are just beginning. For the most part, a great deal of work is still ahead on major jobs okayed in the last six months. Listings are in chronological order.

Northern Natural Gas Co. Loops on main line in Texas, Oklahoma, Kansas, Nebraska, Iowa, and Minnesota, to increase service to communities in Nebraska, Iowa, Minnesota, and South Dakota. Pipe length, 597 miles of 20 and 26-in. Added compressor horsepower, 35,200. Added capacity, 130 MMcf per day. Cost, $51,840,000. Approved Jan. 20.

Virginia Gas Transmission Corp. Metering station at Doylesville, Va., to serve Charlottesville, $9000. Approved Jan. 31.

City of Charlottesville, Va. A 14½-mile, 6-in. line to take gas from Virginia Gas, Doylesville, to Charlottesville (see above). Cost, $225,000. Approved Jan. 31.

Virginia Gas Transmission Corp. Metering station costing $12,500, near Gala, Va., to serve Roanoke. Approved Feb. 10.

Roanoke Pipe Line Co. An 8-in., 30-mile line from Gala to Roanoke, costing $596,800 (see above). Approved Feb. 10.

Tennessee Gas Transmission Co. Four 26-in. lines on Mississippi river highway bridge at Greenville, Miss., and a 5½-mile line to connect crossing with system. Cost, $2,355,880. To improve service to present customers. Approved March 7.

Panhandle Eastern Pipe Line Co. At Albion, Mich., facilities to serve Corning Glass Works, $6000. Approved March 10.

New York State Natural Gas Co. A 16-in. 53½-mile loop, from compressor station in Greene county, Pa., to another in Westmoreland county. Replacement of sections of pipe at storage pools in Tioga and Potter counties also included in the $2,592,582 project. To increase service to present New York and Pennsylvania customers. Approved March 31.

Commonwealth Natural Gas Corp. From Greene county, Va. to Norfolk and Newport News, a 200-mile line costing $6,425,000, serving also Richmond, Suffolk, Petersburg, Portsmouth, and Hopewell. Approved March 31.

Virginia Gas Transmission Corp. Measuring station in Greene county, Va., to serve Commonwealth (see above). Approved March 31.

United Fuel Gas Co. Near Nitro and Clendenin, W. Va., 12 miles of 10- and 12-in pipe, to transport gas to and from storage pools. Transfer of a compressor unit also included in $1,326,000 project. Approved April 17.

Transcontinental Gas Pipe Line Corp. Nine compressor stations with 134,650-hp capacity and sales and supply laterals along its main line in Alabama, Louisiana, Georgia, North Carolina, Virginia, Pennsylvania, New Jersey, New York. To add 165 MMcf capacity and to serve, in Georgia, Jefferson, Commerce, Bowman, Royston, Jonesboro, Monroe, Lawrenceville, Elberton, Hartwell, and Winder; in Alabama, Wedowee, Wadley, Ashland, Lineville, Goodwater, Rockford, Greensboro, Thomaston, Butler, Maplesville, Linden, Clanton, Alexander City, and Roanoke; in Louisiana, Morganza. Cost, $49 million. Approved April 28.

South Jersey Gas Co. For $2,175,000, 78½ miles of mainline and laterals to connect system with Transcontinental's line (see above), to serve Bridgeton Gas Light, Cumberland County Gas, Jersey Central Power & Light, all in New Jersey. Approved April 28.

Trunkline Gas Supply Co. A 740-mile main line with 560 miles of laterals, from Louisiana to Illinois, with 32,000-hp compressor capacity and 250-MMcf delivery. To serve large area in the Midwest. Cost, $80,084,000. Approved May 4.

Panhandle Eastern Pipe Line Co. To enable Panhandle to transport gas received from Trunkline (see above), 160 miles of line, 16,000 hp compressor capacity, costing $15,944,500. Approved May 4.

Virginia Gas Transmission Corp. In Strasburg, Va., a measuring station costing $6500, sending 98 MMcf to Virginia Gas Distribution Corp., partially for resale to Strasburg Lime Co. Approved May 19.

Southern Natural Gas Co. From Gwinville (Miss.) gas field to Aiken, S. C., 496 miles of mainline, 311 miles of laterals, branches, additions, 11,600 hp added in existing stations, 7600 hp in new stations. Costing $32,928,630, system will serve, in Alabama, Demopolis, Livingston, Marion, Uniontown, York, Calera, Jemison, Thorsby, Alabaster, Saginaw, Siluria, Childersburg, Lanett, Langdale, Shawmut, Fairfax, Riverview, Dadeville, Camp Hill, Lafayette, Oneonta, Mount Pinson, Center Point, Cordova, Arab, Guntersville, Cullman, Boaz; in Georgia, West Point, LaGrange, Hogansville, Grantville, Manchester, Talbottom, Augusta, Sandersville, Tennville, Gray, Harlem, Sparta, Waynesboro, Warrenton, Haddock; in South Carolina, Aiken and North Augusta. Also 20 direct industrial customers in these three states and Mississippi. Approved May 22.

Iroquois Gas Corp. To develop three underground storage fields and enlarge an existing one, in Erie and Wyoming counties, N. Y.; 23 miles of line costing $2,119,500. To increase service in Western New York state. Approved May 22.

East Ohio Gas Co. In northeastern Ohio, 24 miles of 20-in. line to enable company to receive gas from Tennessee Gas Transmission Co. near Petersburg for delivery throughout system. Cost, $982,565. Approved June 2.

Associated Natural Gas Co. To serve Sikeston and New Madrid, in southeastern Missouri, taking gas from Texas Eastern, 35½ miles of 6- and 8-in. line costing $934,000. Approved June 14.

Texas Illinois Natural Gas Pipeline Co. Costing $117 million, a 1331-mile line from Texas to Illinois to increase deliveries to Chicago and other communities in Iowa, Illinois, and Indiana. Capacity, 305 MMcf. Approved June 14.

Tennessee Gas Transmission Co. A sales meter station near Morehead, Ky. for sale of gas to Morehead on an interruptible basis. Boosts delivery to 5 MMcf. Cost, $3000. Approved June 23.

East Ohio Gas Co. Two short lines, a 940-hp compressor station, underground storage pool with 13 wells, and 3500 acres of gas storage leaseholds in Columbiana county, $622,700. Includes 12.3 miles of 8-in. line. To benefit entire system in northeastern Ohio, increasing capacity by 33 MMcf. Approved June 29.

Central Kentucky Natural Gas Co. Loops aggregating 41 miles of 20-in. pipe adding 60 MMcf capacity, from North Means, Ky. to Foster, Ky., with an 880-hp compressor unit, serving Cincinnati area. Cost, $2,726,000. Approved June 30.

Texas Gas Transmission Co. Sales meter station costing $3134, in Graves county, Ky. For service to Mayfield, Ky. Approved July 3.

Mayfield Gas Co. For 1.7 miles of 6-in. line to take gas from Texas Gas (see above), serving Mayfield, costing $48,500.

Tennessee Natural Gas Lines Inc. For 24 miles of line adding 13 MMcf per day, serving Nashville, Madison, Amqui, Rayon City, Old Hickory, and Du Pontonia, Tenn., $775,720. Approved July 13.

El Paso Natural Gas Co. A 451-mile line from San Juan basin, N. Mex., to California-Arizona border, costing $44,500,000, serving Pacific Gas & Electric, San Francisco, and, through Southern Union Gas Co., Winslow, Flagstaff, Williams, Prescott, Kingman, Seligman, Holbrook, Ariz.; and Gallup, N. Mex. Capacity, 150 MMcf. Approved July 14.

Pacific Gas & Electric Co. For added compressor power aggregating 32,160 hp on existing Topock-to-Milpitas, Calif. line, $7,800,000 (see above). Approved July 14.

Michigan-Wisconsin Pipe Line Co. Adding 139,000 compressor horsepower along Texas - to - Michigan line, serving areas in Missouri, Iowa, Wisconsin, and Michigan. Cost, $22,732,000. Approved July 14.

Michigan Consolidated Gas Co. For facilities to provide storage capacity required in connection with Michigan-Wisconsin plans (see above), $15,346,500. Approved July 14.

Cities Service Gas Co. To increase amount of withdrawals from Kansas storage fields, 3690 hp in compressor units at North Welda and Johnson county, Kan. Cost, $885,000. Approved July 20.

Arkansas Louisiana Gas Co. To draw more gas from Texas and Louisiana fields, 7000 hp in compressor station near Blanchard, La. Ultimate capacity increase, 109 MMcf; to serve present Arkansas customers. Cost $1,507,000. Approved July 21.

Colorado Interstate Gas Co. To provide more gas for resale to existing markets, a gasoline plant, dehydration plant, 4800-hp compressor plant, and 215 miles of 20-in. line costing $13,857,600. Serving Rocky mountain area. Approved July 24.

Texas Gas Transmission Corp. Two 3.4-mile submarine lines under Mississippi river at Greenville, Miss., and 2 miles of connecting line, 20- and 26-in., costing $1,457,959. Approved July 26.

Acme Natural Gas Corp. To serve three firm industrial customers in Butler, Pa. area, 20 miles of 6-, 8-, and 10-in. line costing $539,000. Delivery boosted to 18 MMcf. Approved July 28.

Ohio Fuel Gas Co. For $781,000, 22 miles of 16-in. line from Centerville to Dayton, Ohio, increasing capacity to 75 MMcf, including removal of Vandalia station. Serve Dayton. Approved Aug. 3.

Prince Georges Gas Corp. To serve Washington, D. C., transporting an added 122 MMcf from Atlantic Seaboard Corp., 20 miles of 22-in. line. Cost, $1,360,000. Approved Aug. 10.

Texas Gas Transmission Corp. To transport more gas to Texas Eastern Transmission Corp., $2,108,887 for 5460 hp at four existing stations and a new 4500-hp station, in Tennessee and Kentucky. Boosts capacity to 60 MMcf. Approved Aug. 16.

Mississippi River Fuel Corp. Mississippi river crossing at St. Louis, authorization to operate 4100-hp units at Perryville and West Point stations, La. Also included in $3,143,995 cost is 45.3 miles of 18-, 24-, and 12-in. line from Dubach to Perryville and in the St. Louis area. Increased output, 34 MMcf. Approved July 31. Supplementary authorization to build four other stations was issued Aug. 24.

Manufacturers Light & Heat Co. For $1,307,970, 48 miles of 4- to 16-in. line in Ohio, Pennsylvania, West Virginia, and 1000 hp in compressor units. Approved Aug. 24.

Natural Gas Co. of West Virginia. In Ohio, 4½ miles of small diameter line costing $110,400, in connection with Manufacturers (see above). Approved Aug. 24.

Home Gas Co. Metering station to sell gas to Rockland Gas Co. for resale in Ramapo, Tuxedo, Tuxedo Park, Sloatsburg, N. Y. Cost, $16,000. Approved Aug. 24.

Cumberland & Allegheny Gas Co. Compressor unit in West Virginia costing $10,700. Approved Aug. 24.

East Ohio Gas Co. A connecting line to make more gas available in winter to Ohio customers, 1 mile of 20-in. line costing $40,940. Approved Aug. 25.

New York State Natural Gas Co. To increase deliveries by 40 MMcf (firm) and 87 MMcf (for peaks) to East Ohio (see above), 62 miles of 20-in. costing $3,792,806. Approved Aug. 25.

Michigan Gas Storage Co. For 4400-hp and other facilities to boost output of storage fields for delivery to Consumers Power Co. on peak days, $765,600. Serves Pontiac, Jackson, Marshall, Kalamazoo, Hastings, Owosso, Flint, Saginaw, Alma, Bay City, Mich. Approved Sept. 14.

United Gas Pipe Line Co. Compressor station, dehydration plant, 16 miles of line in Bossier, Ouachita, and Webster parishes, La., costing $1,813,000 and boosting deliveries 100 MMcf. Approved Sept. 25.

Three of the microwave communications units to be installed in 23 terminal and 35 repeater stations along Transcontinental Gas Pipe Line Corp.'s 1840-mile Texas-to-New York line are shown being checked out for shipment from General Electric's Syracuse, N.Y., plant. From left are P. R. Chamberlain, R. W. Robinson, and E. W. Kenefake of GE. The equipment will operate in the 2000 mc band and will employ pulse time division multiplex.

Amere Gas Utilities Co. For $9000, a measuring station to sell gas to Bluefield, Va., and Bluefield, W. Va., through Bluefield Gas Co. Approved Sept. 18.

Bluefield Gas Co. To take gas from Amere (see above), 14.3 miles of 6-in. line costing $267,200. Approved Sept. 18.

Equitable Gas Co. Near Waynesburg, Pa., a new 3520-hp compressor station and 17.2 miles of 6- to 16-in. line with 21 MMcf capacity, costing $1,684,700. Approved Oct. 2.

New York State Natural Gas Corp. From Leidy gas field in Pennsylvania, 44½ miles of 16- and 18-in. line with 60 MMcf capacity, $1,582,708. Approved Oct. 3.

Hope Natural Gas Co. For $790,000, 19½ miles of 18-in. in Lewis county, W. Va., increasing deliveries by 100 MMcf into Fink storage area. Approved Oct. 11.

El Paso Natural Gas Co. For six city gate metering stations in Phoenix, Ariz. area, and 48 miles of 4- to 16-in. line with a capacity of 67 MMcf, $1,038,404. Approved Nov. 1.

Texas Eastern Transmission Corp. and *New York State Natural Gas Corp.* Joint development of Oakford storage area: three pool meters, two measuring stations, 173 well measuring stations, one 30,000-hp compressor station, a dehydration plant. Total storage capacity, 105 billion cu ft. Delivery capacity, 476 MMcf. Also 32 miles of 6-, 8-, and 20-in. line. Cost to Texas Eastern, $20,522,791; to New York, $20,250,129. Approved Nov. 2.

New York State Natural Gas Corp. A 70-mile, 20-in. line from Oakford storage area (see above) to the Ohio-Pennsylvania state line for delivery to East Ohio Gas Co. and Peoples Natural. Approved Nov. 2.

Texas Eastern Transmission Corp. From Oakford storage (see above) to serve Philadelphia, New Jersey, New York area, 35 miles of 30-in. line.

United Fuel Gas Co. To expand underground storage facilities to 16,995 MMcf for deliveries of 83 MMcf, 5½ miles of line and 6460 hp compressor capacity near Nitro and Hunt, W. Va. Cost, $2,621,061. Approved Nov. 6.

Northeastern Gas Transmission Co. Main lines (400 miles) to connect with Tennessee Gas system near Pittsfield, Mass. and with Transcontinental Gas Pipe Line's mainline near Greenwich, Conn. for deliveries to these areas in New England: in Connecticut, Winsted, Norwalk, Torrington, Stamford, Greenwich, Bridgeport, Darby, Danbury, Wallingford, New Britain; in Massachusetts: Pittsfield, Springfield, Holyoke, Fitchburg, Lynn, Lowell, Haverhill, Westfield, North Adams, Northampton, Worcester, Spencer, Clinton, Leominster, Athol, Arlington, Malden, Salem, Revere, Beverly, Gloucester, Everett, Melrose, Lawrence, Webster; in New Hampshire: Manchester, Concord, Nashua. Capacity, 207 MMcf. Approved Nov. 8.

Tennessee Gas Transmission Co. For service to Northeastern (see above) and others, 1164½ miles of line from Erie county, N. Y., to New York-Massachusetts line, with loops and laterals; 111,680 hp compressors. To deliver 250 MMcf. Approved Nov. 7.

Transcontinental Gas Pipe Line Corp. For service to Northeastern (see above) and others, a $6,504,000 job including 35½ miles of 24-in. from Berger county, N. J., to Greenwich, Conn. and Westchester county, N. Y., 6000-hp compressor units. Includes an 8-in. lateral to Paterson, N. J. Capacity, 79 MMcf. Approved Nov. 7.

New York State Natural Gas Corp. For facilities necessary to develop a new storage pool near Dryden, N. Y., 220 miles of 16-in. from Dryden to Albany, N. Y., and Tioga county, Pa. Cost, $13,118,000. Approved Nov. 8.

Niagara Mohawk Power Corp. To connect its system with that of New York (see above), benefiting Canjoharie, Amsterdam, and Schenectady, N. Y., $1,342,000, including 26 miles of 12- and 16-in.

Piedmont Natural Gas Co. Inc. To serve Charlotte, Winston-Salem, Greensboro, Salisbury, High Point, and Burlington, N. C., and Greenville and Spartanburg, S. C., 74 miles of line costing $1,200,000. Approved Nov. 17 in initial decision authorizing laterals from Transcontinental.

Transcontinental Gas Pipe Line Corp. To add 50 MMcf per day, of which 22 MMcf per day will go to Piedmont (see above), on its Texas-to-New York line.

Southern Natural Gas Co. Costing $67,000, line taps and meters to boost deliveries to north central and Carthage districts in Mississippi and Aliceville and Carrollton, Ala. Capacity, 4.8 MMcf. Okayed Nov. 22.

Tennessee Gas Transmission Co. A sales meter station in Chatauqua county, N. Y., for making sales to Republic Light Heat & Power for resale, benefiting Mayville, Westfield, and Chatauqua, N. Y. Approved Nov. 30.

Choosing Mufflers for Stationary Internal Combustion Engines

Multi-cylinder, high-speed, two-cycle engines have created new problems in muffling wherever they are used. Today, manufacturers base muffler designs on the principles of acoustics.

By MICHAEL P. SIROFF

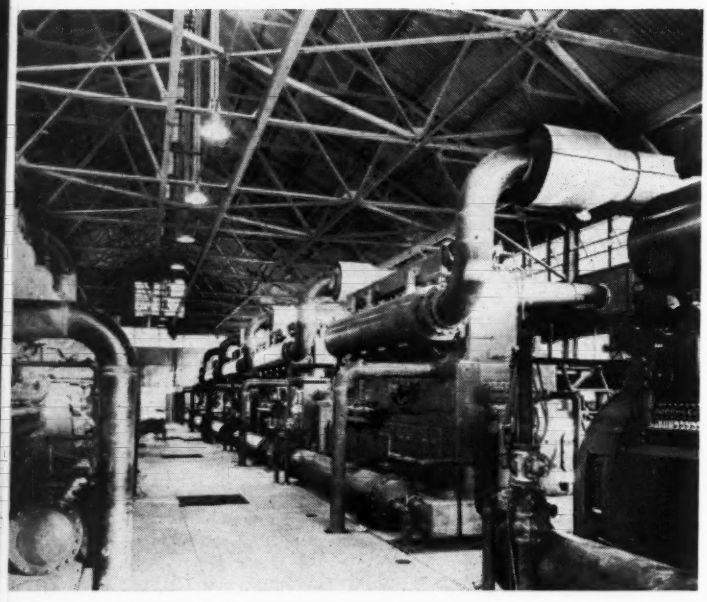


Fig. 2. Typical installation of a dual muffling system. Physical dimensions of system's component parts will vary with cutoff pressure desired and maximum back-pressure allowable.

THE muffling of exhaust gases from stationary internal combustion engines has progressed a long way since the early days when a part of the job of a foreman installing the engine was to fabricate a muffler for it. He would use the material on hand and would apply all his best knowledge and ideas.

Exclusive

Seldom nowadays do we see the concrete pits filled with rocks or cinders that would create a devious path for exhaust gas flow, thereby silencing the noise at the expense of building up a back pressure, or the restriction type muffler which was also so extensively used in the automotive field. Here the exhaust gases would be made to pass through a series of baffles or perforated chambers. The trouble encountered with this type of muffler was that in order to be effective at a low back pressure its size would have to be unduly large.

The introduction of the multi-cylinder, high speed, two-cycle engine, with its inherent sensitivity to excessive exhaust-line lengths, greater exhaust volume per unit horsepower due to scavenging, and the pecularities of its exhaust sound, has created new problems for the muffler designer. Mufflers which were performing satisfactorily on four-cycle engines were found to be inadequate for those of two-cycle type. These are probably some of the reasons why we find that during the last decade more time and effort has been put in muffler research than ever before.

If we analyze the construction of present mufflers for the stationary internal combustion engine, we will find that as far as the problem of sound attenuation is concerned, almost all of them are designed on the basic principles of acoustics.

Muffler Requirements

Any muffler, in addition to being a good silencing device, must be designed to perform all of the following functions:

1. To eliminate pulsative waves set up in the exhaust gases by the reciprocating motions of the power pistons.
2. To meet the minimum pressure drop requirement as set by the engine manufacturer.
3. To discharge the exhaust gases to an elevation where they will not be harmful to surroundings or to persons.
4. To combine all the desirable performance characteristics with those of design uniformity, parts interchangeability and production economy.

Poorly designed and improperly located mufflers have an adverse effect on engine performance because of the presence of pulsations in the exhaust gas stream. The exhaust pipe extending from the engine exhaust manifold to its connection with mufflers has a definite resonant frequency, depending on its length and the temperature of the exhaust gas. If the fundamental resonant frequency of this pipe is equal to that of the fundamental frequency of the engine, trouble will almost certainly result. In order to eliminate the possibility of this occurrence, certain empirical formulae have been developed by use of which one can calculate the safest length of the exhaust pipe for each engine. The best solution in such cases would be to design a muffler that would eliminate the gas stream pulsations as well as silence the exhaust noise. The application of such muffler would be especially desirable for two-cycle engines of crankcase scavenging type which are quite sensitive to pulsations and high back pressures.

One of the developments in the design of modern mufflers that came out during the last two years is the dual system of muffling. As can be seen from *Fig. 1*, the system consists of three component parts: high frequency attenuating chamber (A), properly sized exhaust pipe (B), and a low frequency attenuating chamber (C), usually loca-

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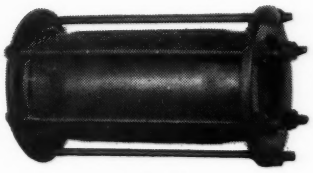

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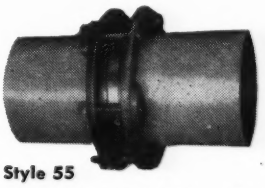

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Dresser Split Repair Sleeves are a quick, efficient means of repairing breaks, splits, holes and other failures in pipe lines. Easy to install. No loose parts —no welding. Self-sealing end-gasket pressure increases as line pressure increases. Sizes 6″ through 24″.

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Style 111

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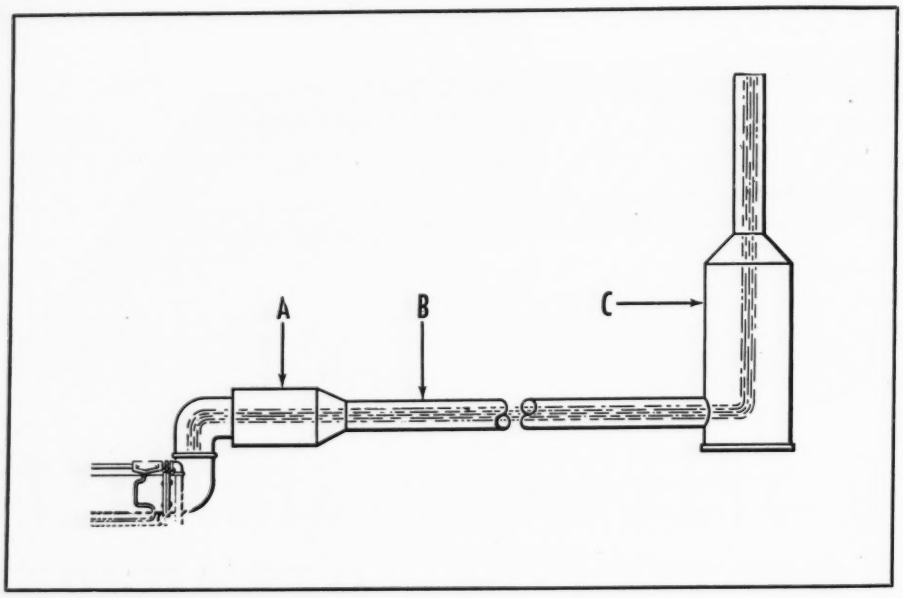


Fig. 1. Dual system of muffling: (a) high frequency attenuating chambers; (b) properly sized exhaust pipe; and (c) low frequency attenuating chamber.

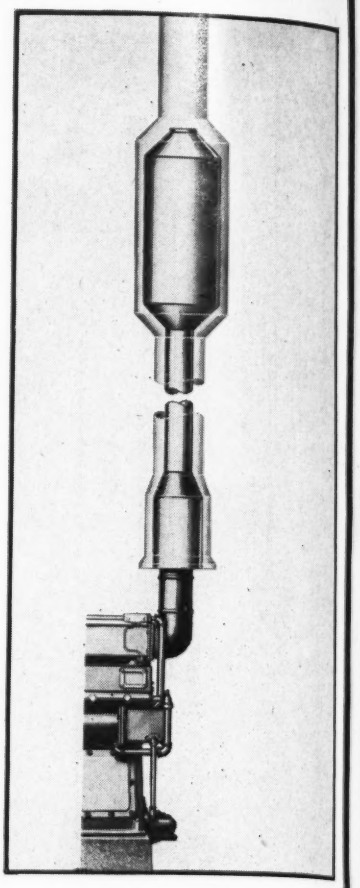


Fig. 3. Air-cooled bottom inlet dual-type muffler, used extensively in natural gas and petroleum industries.

ted outside of the engine room. The advantage of this system lies in the fact that it can be so designed as to perform a double function, that of pulsation dampening and of sound attenuation. When properly designed, this system will eliminate the danger of reflections and conditions of resonance in the exhaust pipe, thereby permitting the installation of the second chamber at any distance from the engine. The physical dimensions of the system's component parts will vary with the cut-off frequency desired and the maximum back-pressure allowable. One of the typical installations of this system is shown in *Fig. 2.*

What Is Proper?

The magnitude of back pressure created by a muffler has a definite bearing on the performance of the engine; however, there is a great difference of opinion among engineers and engine manufacturers as to what is the proper back pressure. We know that in the automotive field mufflers can be designed for a much higher back pressure than in the stationary engines, the average being about 6 in. of mercury column for the quiet type. We also know that two-cycle stationary engines, especially those of "crankcase scavenging" type, are very sensitive to high back pressure which represents lost work and decreased efficiency; we, therefore, have found that the average design pressure drop for mufflers on stationary internal combustion engines lies between 4 and 10 in. of water column.

It should be pointed out that mercury or water monometers do not always give the complete and true picture of the back pressure. The presence of pulsations in the exhaust gas flow makes it extremely difficult to determine the real magnitude of the back pressure. This may be further complicated if reflections and stationary waves are present. Probably the best way to get reliable data is to use one of the specially developed instruments known as electrical differential pressure indicators.

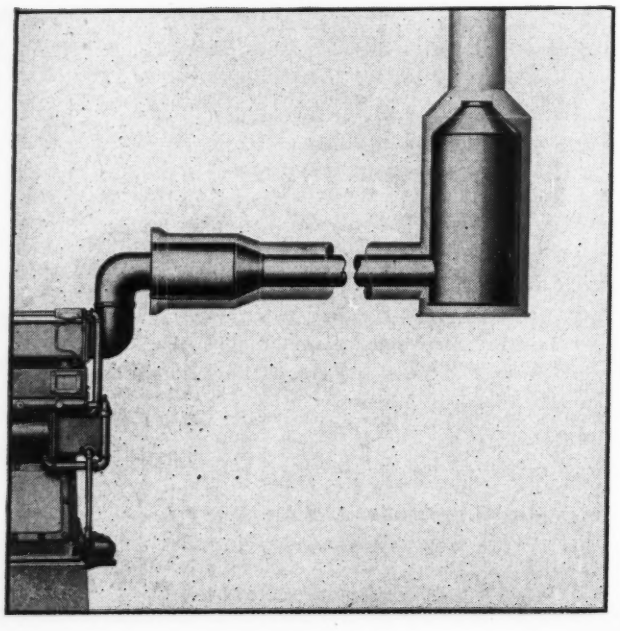


Fig. 4. Air-cooled side inlet dual-type muffler. This type, like that in Fig. 3, has wide use in gas and petroleum industries and in marine engine installations.

"Standard" Mufflers

Since it is economically undesirable for a muffler manufacturer to design a muffler for every stationary internal combustion engine on the market or in the field, he usually resorts to the practice of establishing a line of "standard" mufflers. Each unit of this line is then so designed as to cover a certain range of engines depending on thier hosre-power ratings, type of fuel, number of strokes, speeds, etc. The number of units in a line may be anywhere from

At Sun Oil's Starr County Plant . . .

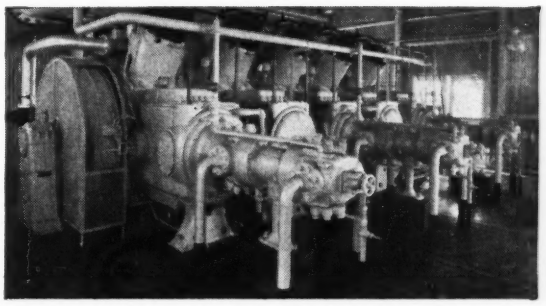
A 4-WAY JOB FOR MODERN COOPER-BESSEMERS

In this new natural gasoline plant, engineered by Petroleum Engineering, Inc., there's good evidence of how well, how efficiently Cooper-Bessemer units of various types meet today's needs in power, compressing and pumping.

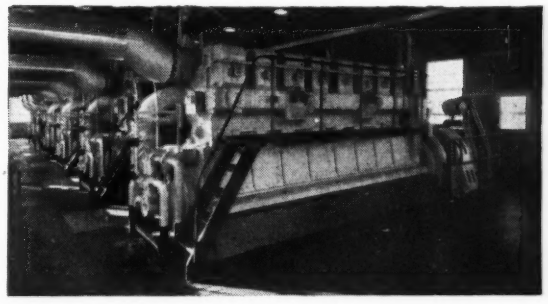
For in this one modern project, as shown here, you'll find Cooper-Bessemer in-line gas engines driving generators for all electric power requirements. And you'll find space-saving Cooper-Bessemer Twin-line pumps handling lean oil. These pumps in turn are direct-driven by compact Cooper-Bessemer GMX V-Type gas engines. Finally, last but not least, a 1,100 hp Cooper-Bessemer GMV Turboflow, tops today in compressor compactness and over-all economy, handles residue gas for return to a field reservoir.

To get at the reason *why* Cooper-Bessemers have been picked for all these services, you have only to weigh the important *new* developments introduced during recent years by one of America's *oldest* builders of engines and allied machinery.

Another Example of Efficient Power at Lower Cost

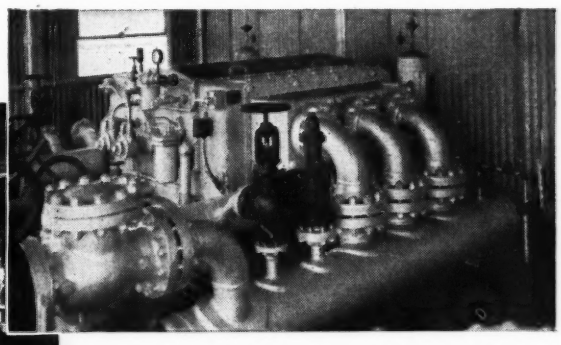


This 10-cylinder, 1100 hp GMV Turboflow compressor, known for extreme compactness and over-all operating economy, compresses residue gas from 1,000 to 2500 psi for return to field reservoir. Automatic control maintains constant pre-set discharge pressure.

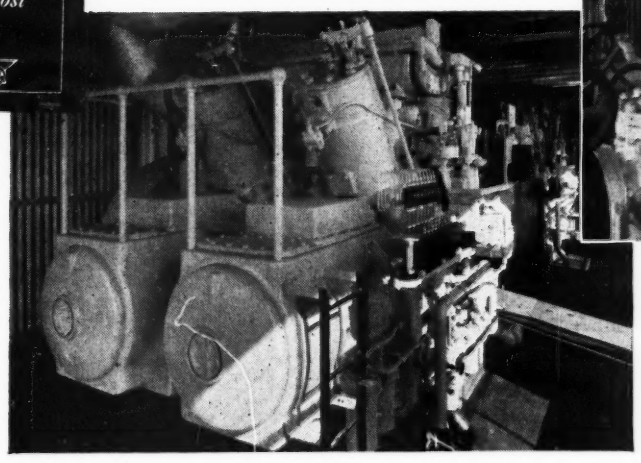


This line-up of Cooper-Bessemer gas engines in generating plant consists of four 600 hp, 8-cylinder JS's driving Ideal 400 kw generators and three 280 hp, 5-cylinder Type GS engines driving Ideal 200 kw generators.

Exterior of generator building showing muffler, air filter and oil cooler equipment.



One of two Cooper-Bessemer Twin-line lean oil pumps in Sun Oil Starr County plant. High pressure side (foreground) is designed to operate on 41 API gravity lean oil, from 220 to 1100 psi while handling 248 gpm. Other side, in series, operates from 20 to 225 psi while handling 388 gpm.



Two Cooper-Bessemer GMX-4, V-Type gas engines, each direct-driving a Twin-line 6-cylinder lean oil pump through fire wall. Each GMX is rated 200 hp at 400 rpm.

The Cooper-Bessemer Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York City Washington, D. C. Bradford, Pa. Parkersburg, W. Va.
San Francisco, Calif. Houston, Dallas, Greggton, Pampa and Odessa, Texas
Seattle, Wash. Tulsa, Okla. Shreveport, La. St. Louis, Mo. Los Angeles, Calif.
Caracas, Venezuela Gloucester, Mass. Calmes Engineering Co., New Orleans, La.

16 to more than 20.

In the dual system of mufflers described previously, fitting of an engine with a proper muffling system is made easier than with the ordinary muffler. Since the dual system consists of three component parts (two chambers and the exhaust pipe), the designer has a number of combinations or standard parts from which he can select a most effective combination for a given engine.

Muffler Manufacture

Some muffler manufacturers offer more than one standard line of mufflers. Usually one of these is designed to do a better silencing job than the others, and is offered for such installations as hospitals, hotels, and residential districts where quiet is to be maintained. Other manufacturers treat such installations as special cases and usually design a muffler or a muffling system to meet the requirements.

All mufflers used on stationary internal combustion engines, whether single-unit or dual-system type, may be divided into two general classes: air-cooled and non-air-cooled. In order to better fit into engine house layout, each of these mufflers may have an exhaust inlet located either at the bottom or on the side. Thus we have the bottom inlet type and the side inlet type. The latter type may have the exhaust inlet flange located at the top of the shell or near the base plate.

Advantages

The air-cooled mufflers shown in *Figs. 3 and 4* are used extensively in the petroleum and natural gas industries as well as in marine engine installations. Their main advantages can be summarized as follows:

1. They provide a positive induced draft ventilation of the engine room.
2. They reduce the temperature of muffler shell and exhaust pipe, thereby greatly prolonging their lives.
3. They eliminate the necessity of lagging and inherent possibility of burnouts under it.
4. They reduce the final exhaust temperature.

The quantity of air educted by an air-cooled muffler depends on many factors, such as the air resistance of the ventilating system, nozzle and throat design of mufflers, engine load, engine speed, etc. Actual performance tests in marine installations with large diameter air ducts have recorded air draw-in ratios by weight of six parts of air to one part of exhaust gas. In ordinary compressor house installations there is usually no need for such high degree of ventilation, and air-cooled mufflers are designed for draws of from one to three parts of air to one part of exhaust. The number of air changes effected by air-cooled mufflers varies from 10 to 15 per hour, depending on design of the ventilating system.

MICHAEL P. SIROFF was graduated from the University of Southern California with a B.S. degree in 1932. From 1932 to 1938, he worked in the oil refinery industry in China. The Sino-Japanese war eventually caused his departure from the Orient.

He spent the next three years in South America (he rebuilt and modernized an oil refinery in Chile), and in 1941 joined Fluor Corp. Ltd., Los Angeles. At present, he is design engineer of metal products in the corporation's manufacturing division.

Non-Air-Cooled Mufflers

The non-air-cooled mufflers are designed for the same sound muffling efficiency as the air-cooled ones, and their application is reserved for those installations where engine room ventilation is not an important consideration. These mufflers are mostly of bottom inlet type and are especially adapted for vertical installations.

There are various special types of mufflers that are being used on stationary internal combustion engines. Of these we shall mention:

Spark arrestor-mufflers

Heat economizer-mufflers

Waste heat boiler-mufflers with or without spark arresting features.

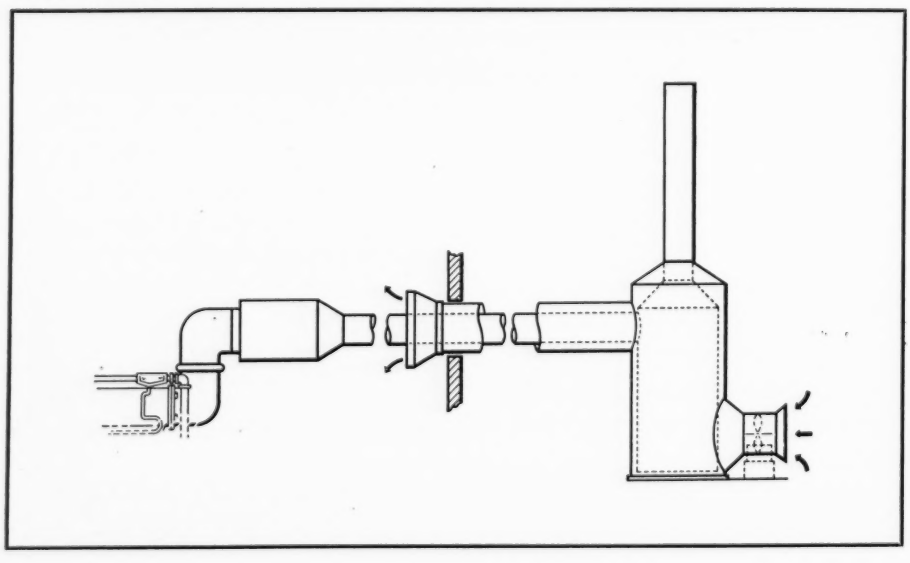
In fire-hazardous areas, such as oil refineries, or where dirt nuisance is not tolerated, spark arrestor mufflers are being used. The spark arresting element is usually a single cyclone unit around which a muffler proper is built. Properly designed cyclone units usually have efficiency of 95% or higher without sacrificing the silencing property of a muffler.

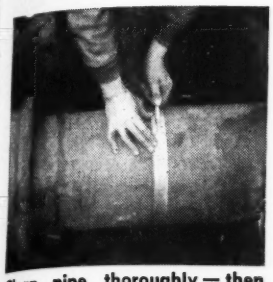
Heating Engine Houses

Heat economizing mufflers are just a variation of an air-cooled muffler mentioned previously and are used for heating engine houses during cold months. *Fig. 5* illustrates one type whereby outside air is circulated around the hot muffler shell and exhaust pipe by means of a blower, and then is discharged into the engine room. Hot air by-pass and a damper device are usually required to control the temperature of hot air entering the room.

Waste heat boiler-mufflers are designed to utilize the exhaust heat for generation of steam or hot water. Heat transfer rates are greatly improved by high mass velocities and extension of heating surface. Installed on a four-cycle diesel engine for generation of 30.0 psig steam, approximately .75 lb of steam per brake horsepower were developed, according to reports of engineers who checked the operation.

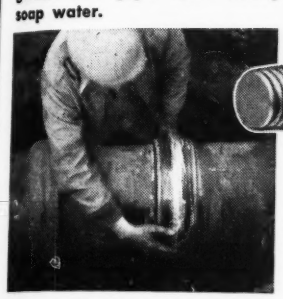
Fig. 5. Heat economizer dual-type muffler. Outside air is circulated around the hot muffler shell and exhaust pipe by means of a blower, and then is discharged into the engine room.



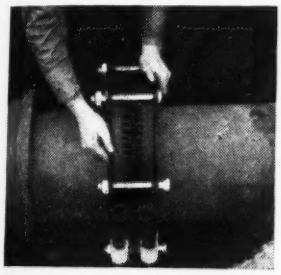


Clean pipe thoroughly — then center brass band over break, bending tab back to lock.

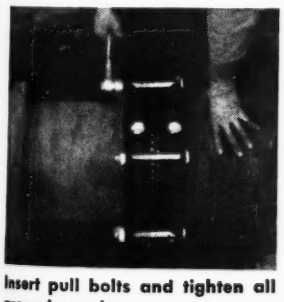
Thoroughly soap both sides of gasket and pipe with heavy soap water.



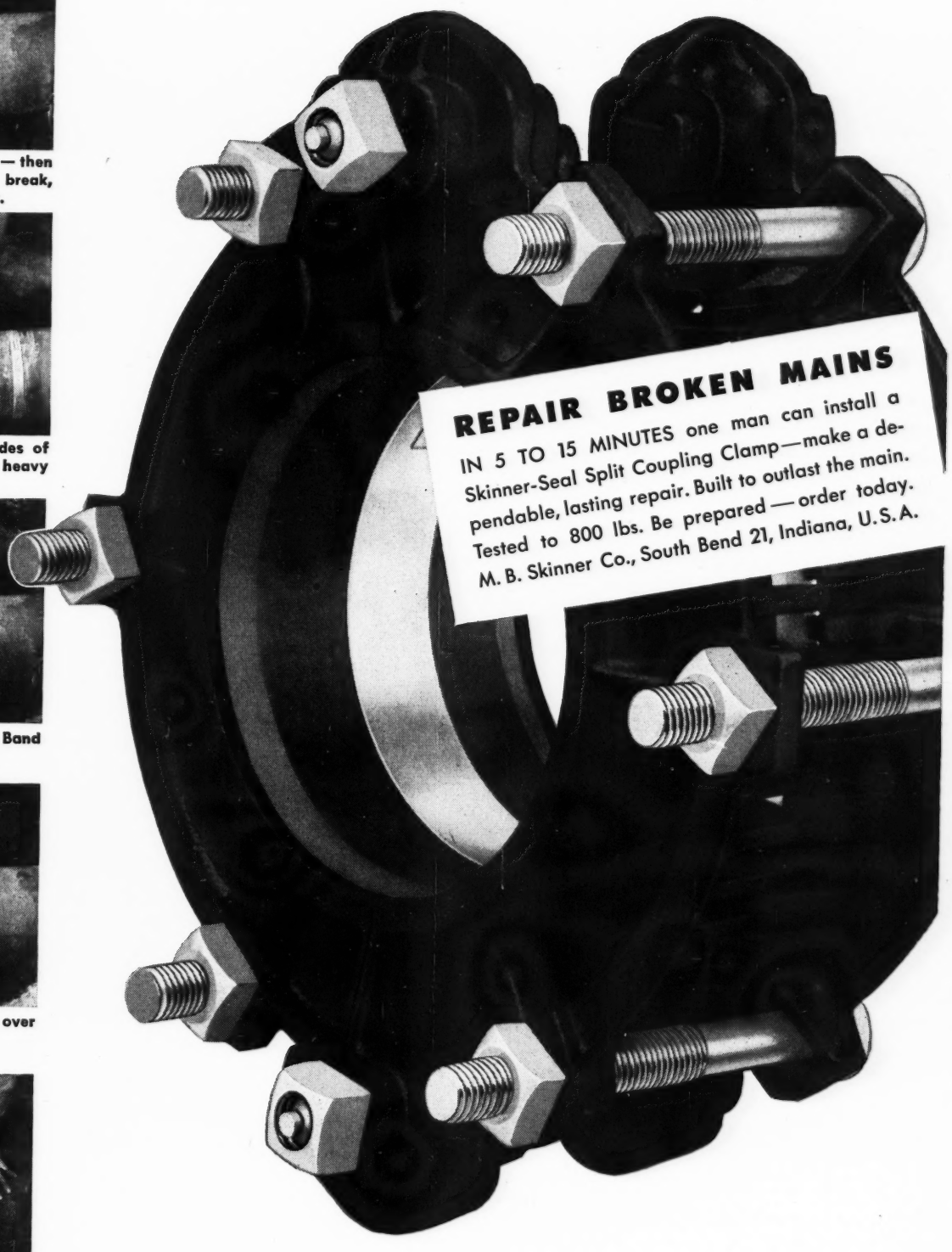
Center gasket and Monel Band over brass band.



Assemble halves of clamp over pipe and bolt together.



Insert pull bolts and tighten all around evenly.



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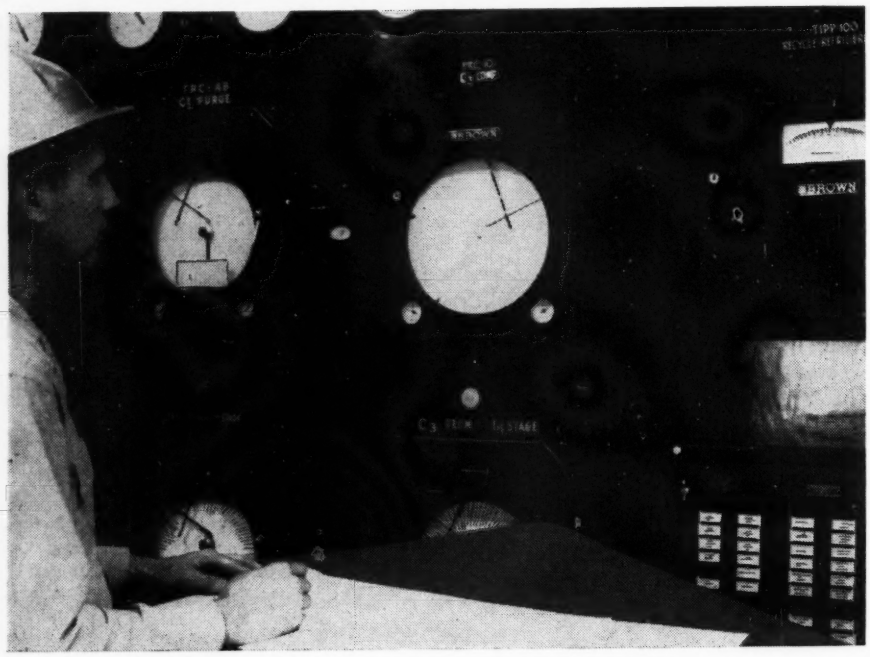


DIFFERENTIAL pressure controller (center of panel) for recycle gas.

Boosters Maintain Constant Pressure With Automatic Speed Controls

Tests at butyl rubber plant with engine-driven compressor engines prove control system value.

By Kenneth Ruhl

FOR optimum results in the automatic control of the over-all pressure of engine-driven gas compressors, some type of automatic speed regulator is essential. Either a conventional governor or the pump-instrument type of speed control (to be described later) is satisfactory. This requirement stems from the fact that, besides the compressor suction pressure, there are several factors to be controlled, which can vary independently and which necessitate an engine fuel gas rate correction to maintain uniform speed. This is particularly true where multiple compressor units are involved.

Without some type of automatic speed regulator, poor control of over-all pressure will result unless other independent factors remain constant. This is seldom the case since such factors as the following affect the engine speed: (1) fuel gas pressure; (2) Btu content per cubic foot of fuel gas; and (3) compressor discharge pressure which affects the engine load.

All of these factors require engine fuel gas corrections to maintain uniform speed. With independent automatic speed control, the effects of these factors on engine speeds are, in substance, nullified. As a result, control of suction pressure can readily be established on the predication of an automatically maintained engine speed.

More accurate maintenance of the constant *over-all pressure* developed by type GMV, Cooper-Bessemer six-cylinder gas engine-driven compressor units is assured by the use of an ingenious automatic control system incorporating Brown Air-O-Line controllers. Moreover, the system described here greatly facilitates operation. Units can readily be placed in, or removed from, operation without disturbing pressure conditions, and without making several speed adjustments on the other units, such as is required when manual control is employed.

An Example

Illustrative of both the control techniques and the equipment employed is the installation of 24 Cooper-Bessemer compressor units for a butyl rubber project at Baytown, Texas. Here, three pressure controllers regulate the engine speeds of 24 gas compressor units whose combined output is rated at 14,400 hp. Each gas compressor unit is rated at 600 hp at 300 rpm. All of the compressor units are two stage and comprise two first and one second-stage cylinder. The cylinders are double acting. At each stroke they compress gas at one end while taking suction at the opposite end of the cylinder.

To meet processing requirements, the gas compressors are connected so as to provide three separate services, namely, propane, ethylene, and recycle gas. One pressure controller is required for each service. For the propane and ethylene services, the control instruments are equipped with spiral-actuated measuring elements of alloy steel with a measuring range of from 10 in. of mercury vacuum, through zero to 25 psi pressure.

Three Controllers

The recycle gas service is provided with a control system comprising a Brown differential pressure-type pneumatic transmitter which is actuated by a mercury-manometer-type meter body, and a pneumatic receiver-controller. The measuring range is from 15 in. of mercury vacuum, through zero to 10 psig pressure. The measuring arrangement comprises a mercury manometer

Mr. Ruhl is a member of the measurement and instrument department, El Paso Natural Gas Co. His article orig'nally appeared in Vol. 4, No. 6 of *Instrumentation*, publication of Brown Instruments division, Minneapolis-Honeywell Regulator Co.

with one leg open to the atmosphere and the other terminating in a pressure tap installed in the suction line from the compressors. This method of measurement provides accurate measurement and control of pressures close to atmospheric. As such, it is generally more satisfactory for the particular demands of the recycle gas service than are other methods.

Essentially, the action of all three controllers is the same—to maintain a constant suction pressure to the compressors by regulating the speed of the driving engines. Each controller determines the speed of a number of engines simultaneously. The controller for the propane compressor service governs speed of eight engines; that for the ethylene service, ten engines; and that for recycle gas service, six engines. In operation, the controllers increase the speed of the engines when the suction pressure tends to rise above the controller set point, and decrease the speed if the suction pressure falls below it.

Governor Speed Control

Seventeen of the engines in use employ mechanical governors to regulate the fuel gas to produce the desired engine speed. With these engines, a change of the spring tension on the governor alters the engine speed. The remaining seven engines use a hydraulic-pneumatic system for speed regulation in which the fuel supply to the engines is regulated by means of an instrument.

Fig. 1 represents, in simplified schematic form, the method of automatically adjusting the governor spring tension to regulate engine speed. In operation, the diaphragm motor, shown linked to the spring tension on the governor, responds to changes in the control air pressure from the Air-O-Line controller as the suction pressure deviates from the set point. To secure sufficient power to obtain precise positioning of the governor spring tension, regardless of friction or other opposing forces, a valve positioner is used on the diaphragm motor.

With the particular type of governor used with these engines, a considerable speed droop is evidenced with increased load. This, in fact, increases the stability of the engines and is not a detrimental operating characteristic since the controller automatically compensates for any speed droop in the governor. In effect, the adjustable automatic reset action of the controller continually readjusts the proportional band to accurately maintain the desired suction pressure. Once the reset action is set to suit the characteristics of the combined engines, control is stable and no further adjustment is necessary.

To prevent overspeed of the engines in case of an extreme or rapid demand increase, a positive adjustable stop is provided on each of the diaphragm motors. These stops represent a maximum speed position of the governor. A liquid dashpot is also installed on the fuel lever of the governor to time the rate of fuel increase to the engine. This prevents flooding the engines on sudden or rapid load increases. A manual-automatic control arrangement is provided for each engine to permit bringing a unit up to speed before placing it on the line.

Instrument Speed Control

The instrument type of speed control employed with the seven engines not equipped with governors is shown schematically in *Fig. 2*. As shown, a positive displacement rotary gear pump is driven by the governor drive gears. The pump takes suction from an atmospheric sump tank near the pump and discharges through an adjustable orifice beneath the surface of the liquid in the same tank. The liquid in the tank is a special oil which has uniform viscosity changes with temperature changes. The orifice is temperature compensated automatically from 40° to 120°F.

When the engine operates, the pump speed is constantly proportional to the engine speed. As a result, the discharge pressure from the pump will vary as the square of the engine speed. With the pressure-sensitive element of a recording pneumatic pressure controller connected between the pump and the orifice on the discharge line, and a square root chart of the proper range on the recorder, the instrument, in effect, functions as a recording tachometer. It thus reflects variations in the speed of the engine and thereby provides a control action which constitutes a basis for governing engine speed.

Engine Regulation

Actual regulation of engine speed is accomplished by pneumatically linking the pressure controller to a diaphragm motor which actuates the fuel gas valve on the engine. In operation, an increase of oil pressure from the pump decreases the control air pressure and causes the diaphragm motor to operate the engine fuel valve and reduce the fuel to the engine, thus diminishing its speed. Hence, with the set point of the pressure controller adjusted to a particular engine speed, the control action automatically maintains the speed at that level.

To maintain the compressor output constantly at the desired level, an Air-O-Line flow or pressure controller, shown in *Fig. 2*, is pneumatically connected to the recording-tachometer controller. A bellows arrangement incorporated in this latter instrument repositions its set point index in response to control air pressure changes.

Should the compressor suction pressure tend to rise above the desired level, the controller reacts by moving the set point of the speed controller upscale, causing the controller, in turn, to increase the engine speed.

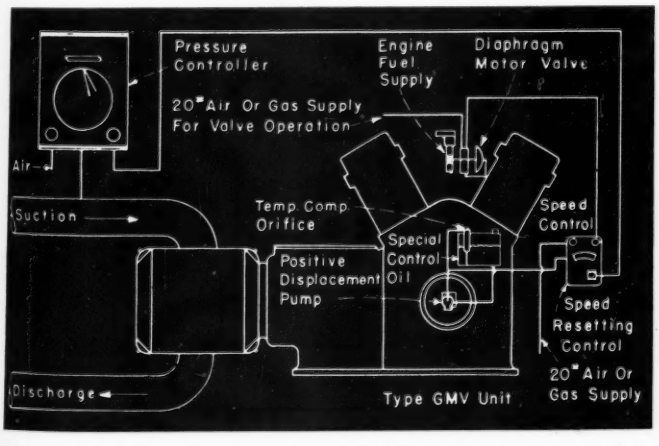


Fig. 1. Schematic diagram showing speed control by governor reset.

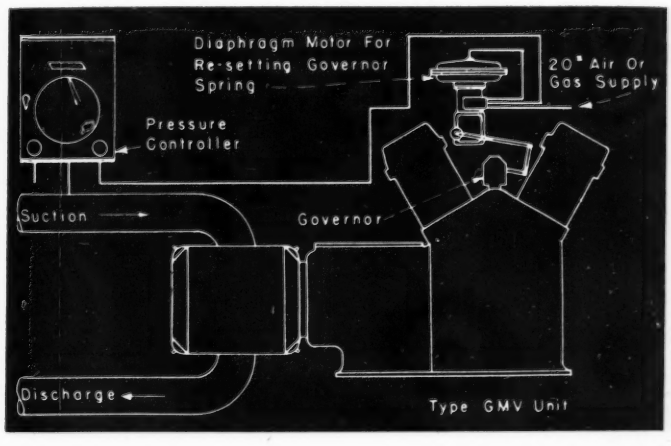


Fig. 2. Schematic diagram showing speed control by instrument reset.

PIPELINE NEWS

WESTERN THRILLER

Three firms battle for Utah rights

Three companies are now in the Utah natural gas supply picture.

Last month, Utah Pipe Line Co., a Dallas firm headed by Oilman Clint Murchison, placed its bid with the Federal Power Commission and the Utah Public Service Commission for a 392-mile line extending from a point near Aztec, N. Mex., in the famed "four corners" area, to Salt Lake City, and thus became the third applicant for the right to serve the Mormon metropolis.

Faced with this new development, the state body, which was already refereeing a dispute between Mountain Fuel Supply Co., the Salt Lake distributor, and Utah Natural Gas Co., recessed hearings until Jan. 29 to give the three battlers a chance to sharpen their weapons.

The commission had conducted hearings for a week to determine the feasibility of the proposal of Utah Natural to build two 22-in. lines aggregating 360 miles, one to serve Monticello, Moab, Green River, Fairview, Fountain Green, Nephi, Provo, and Salt Lake, the other to take off from this line and carry gas to Sevier and Sanpete counties. The second line was included in a November amendment to the application submitted early last summer.

Mountain Fuel already serves Salt Lake City with Wyoming gas, and is fighting the other two companies, although Utah Natural has stated its market will not conflict with Mountain Fuel's, being principally industrial and commercial.

Utah Pipe Line, which would spend $22 million, plans to serve chiefly industrial customers in Salt Lake, but would also supply towns en route. Included are Cortez, Colo., and Moab, Green River, Wellington, and Price, Utah.

With initial demands estimated at from 60 MMcf to 95 MMcf per day, the system would have a capacity of 96 MMcf.

Southeastern Michigan Will Take Gas from Panhandle

Southeastern Michigan Gas Co.'s (Port Huron) latest proposal to construct pipeline facilities to serve its area has been authorized by the FPC, and Panhandle Eastern Pipe Line Co. has been directed to supply 5 MMcf daily to the Michigan company, subject to 100% curtailment this winter.

The $1,402,632 project includes about 55 miles of 12¾-in. line from Panhandle's facilities in the Clawson, Mich. area to Marysville, where the line will connect with distribution facilities to be acquired from Detroit Edison Co., which now serves the area with manufactured gas.

Southeastern's system will be able to deliver 18 MMcf daily and will serve Port Huron, Marysville, St. Clair, and contiguous areas in St. Clair and Macomb counties. Detroit Edison's Marysville manufactured gas production plant will be continued and during curtailment periods, it would produce enriched manufactured gas of high Btu content.

The Port Huron firm estimated at the time of the approval that its 55-mile line could be completed in about two months. The company plans to interconnect the line with the Detroit Edison system at New Haven, Mich. and to convert the DE system to natural. The changeover will probably be finished this month.

Texas Gas May Reach New England by Labor Day

Natural gas, which distributors say may reduce rates by as much as 10%, may reach some New Englanders by next Labor Day and others early in 1952. Northeastern Gas Transmission Co. has predicted this service, and another promise of natural next winter, if its project is approved, has come from Algonquin Gas Transmission Co.

The Federal Power Commission is currently considering Algonquin's plan to serve Rhode Island and parts of Connecticut and Massachusetts. Approval is dependent upon the company's proof of ability to acquire sufficient natural gas to serve the area.

At least one company in the Northeast sees a possible net saving of 25%. It has dismissed plans to increase manufactured gas rates by 10 to 15% and may actually charge about 10% *less* for natural gas.

Hearings on Algonquin's proposal were to be resumed Dec. 18, and on Dec. 11, FPC was to consider Texas Eastern Transmission Corp.'s application seeking authorization to expand the sales capacity of its pipeline system to make gas available to Algonquin and others.

Piedmont Line for Carolinas Wins Initial Approval

An initial decision, subject to review by the FPC, has been filed to authorize Piedmont Natural Gas Co. Inc., Spartanburg, S. C. to serve markets in North and South Carolina by constructing a series of lateral pipelines extending from connections with the Transcontinental Gas Pipe Line Corp. system.

The examiner's decision would also authorize Transcon to increase the capacity of its Texas-to-New York line by 50 MMcf per day, up to 22 million of which would be delivered to Piedmont. Applications of two other companies — Carolina Natural Gas Corp., Charlotte, N. C. and Public Service Co. of North Carolina Inc., Gastonia—were denied, although hearings will be reopened for the filing of amendments eliminating communities which Piedmont was authorized to serve.

Piedmont's project includes 73.7 miles of laterals to serve Charlotte, Winston-Salem, Greensboro, Salisbury, High Point, and Burlington, N. C. and Greenville and Spartanburg, S. C. Estimated cost is $1.2 million. Compressor station capacity of 4800 hp would be added during the first year by Transcon and 40,875 during the second year.

Of the 50 MMcf Transcon will have available, Piedmont and Southwestern Virginia Gas Co., Martinsville, Va., would get 22 MMcf and 500 Mcf daily, respectively; Frederick (Md.) Gas Co. Inc. would receive up to 675 Mcf per day and the town of Toccoa, Ga. up to 2.5 MMcf.

Kansas-Nebraska Facilities To Benefit 47 Communities

Forty-seven Nebraska communities will begin receiving natural gas if the FPC considers advisable the recent application of Kansas-Nebraska Natural Gas Co., Phillipsburg, Kan., to add lines and compressor stations on its system.

Kansas-Nebraska, which estimates the cost of the plan at $5,201,331, would add three new stations with combined horsepower of 3570 — at Albion and Holcomb, Kan. and Grand Island, Neb. — and put on an extra 2000 hp at its Palco station; build larger capacity cooling equipment at its Scott City, Kan. station, and install a 44 MMcf dehydration pant at Holcomb; put in nearly 500 miles of new and replacement lines; and install border stations for sales measurement.

Capacity would thereby be hiked from 146 MMcf to 164.2 MMcf per day.

Thirty-seven communities would be served at retail, one would be served at wholesale, and nine would receive service through Central Electric & Gas Co. as distributor.

Colorado Additions Sought

Colorado-Wyoming Gas Co., Denver, has asked the Federal Power Commission for permission to construct pipeline facilities to serve several towns in Colorado, to replace some existing lines with larger sized pipe, and to abandon, salvage, or sell certain other facilities.

The company would construct laterals and meter stations to supply gas to Public Service Co. of Colorado for resale in Westminster, Eastlake, Lafayette, Louisville, Campion, and the Mount Olivet area. In addition, Colorado-Wyoming would supply gas to Greeley Gas & Fuel Co. for resale in Pierce, Nunn, and Platteville.

Although capital investment of the proposed projects is $771,850, retirements are estimated at $229,756, making a net property increase of $542,094 by the end of 1952, when the construction would be completed.

Texoma Dissolution Planned

A merger which would dissolve Texoma Natural Gas Co. and place all its properties in the hands of Natural Gas Pipeline Co. of America is provided in a joint application recently filed with FPC by the two Peoples Gas Light & Coke Co., Chicago, subsidiaries.

Natural Gas is the sole customer of Texoma, which provides it with 340 MMcf per day, 60% of its needs. Involved in the deal are two transmission stations in Texas, and two lines, one 70 miles long, the other 74 miles, connecting the two stations with Natural's system near Gray, Okla.

Natural would issue to Peoples 5000 shares of its no-par value stock for the 10,000 shares of Texoma which Peoples owns.

The going has been soggy in Texas for pipeline crews who have been laying the 30-in. line for Texas-Illinois Natural Gas Pipeline Co. In a sea of mud near Cleveland, a clam is shown battling to keep the ditch open for the lowering-in crew.

Classroom, Field Work Set Up For Corrosion Short Course

February 21-23 are the dates selected by the Tulsa section of the National Assn. of Corrosion Engineers for a short course on practical control of pipeline corrosion. A similar school was conducted by the section last February, and others were held at Shreveport and Cleveland during the year.

General chairman for the school is J. N. Hunter Jr., Service Pipe Line Co. He will be assisted by Hugh A. Brady, Gulf Refining Co. (field work), Yale W. Titterington, Dowell Inc. (demonstration - discussions), Maynard H. Jackson, Middle West Coating & Supply (hotel and transportation), and T. D. Williamson Jr., T. D. Williamson Inc. (publicity).

According to Mr. Hunter, the course will be divided between field work at pipeline locations near Tulsa and sessions at the Mayo hotel. Major items to be considered include corrosion and its control, coating materials and application, rectifiers, expendable anodes, corrosion surveys; use, care, and handling of insulating flanges and nipples.

Information is available from Mr. Hunter at Box 1979, Tulsa 2.

New Taps on TGT Line Okayed

Late in November the Federal Power Commission gave Tennessee Gas Transmission Co., Houston, a go-ahead to construct a sales meter station on its main line in Chautauqua county, N. Y., for the sale of natural gas to Republic Light, Heat & Power Co., Buffalo.

Republic's initial requirements, for resale in Mayville, Westfield, and Chautauqua, total 6 MMcf per day.

Opposition to the project was presented by the cities of Ripley, Booneville, and Baldwyn, Miss. On Dec. 14, however, the commission issued a separate order directing TGT to connect its system with facilities to be built by the three cities. Ripley will receive up to 1 MMcf daily, Booneville up to .7 MMcf, and Baldwyn to .35 MMcf.

Facilities to be constructed by the Mississippi cities include 38 miles of 6-in. and two short tap lines. Overall capacity will be 8.64 MMcf per day.

Kansas City Suburb Asks Gas

A million-dollar pipeline, capable of bringing 30 MMcf per day from Cities Service Gas Co.'s line near Kansas City, Mo., to the Clay county area has been proposed in an application recently made by The Central West Utility Co., Kansas City, to the FPC.

Central West, which has been receiving its gas supplies from Panhandle Eastern Pipe Line Corp., Kansas City, claims the supply is insufficient, particularly in view of anticipated new industrial projects. It seeks either an order from the commission directing Cities Service to make a connection with the proposed line, or to disclaim jurisdiction.

The line would consist of 30 miles of 12-in. pipe.

Texas Gas for Toronto Planned

A $47,403,000 program which would make available 115 MMcf daily for delivery at the U. S.-Canadian border for consumption in Toronto and other Ontario markets has been presented to the FPC by Tennessee Gas Transmission Co., Houston.

Niagara Gas Transmission Ltd., a new Ontario corporation controlled by Consumers Gas Co. of Toronto, would receive the gas through a 45-mile spur from Buffalo, N. Y. to near Niagara Falls, N. Y. Niagara Gas then would resell to Consumers and to others.

In addition, Tennessee would build about 170 miles of loop sections along its system from Texas to Kentucky and 96 miles of loop along its Kentucky-to-Buffalo extension, install compressor units totaling 56,000 hp in existing stations, and build two 8000-hp stations at Findley Lake, N. Y. and Mittie, La.

Lone Star Buys Producing Area

Early last month Lone Star Producing Co. purchased extensive oil and gas properties in Stephens county, west central Texas, which were formerly owned by Fred M. Manning Inc., Denver. The acquisition included about 40 net wells, some of which are gas producers. Most of the wells are in the Manning-O'Connor field nine miles north of Cisco. Also purchased was the pressure maintenance plant and system installed in the field by Manning.

The newly acquired properties will be incorporated into Lone Star Producing's west central district operations.

Pipeline Newsnotes

Interstate Power Co., Dubuque, Iowa has asked the Federal Power Commission to authorize construction of a 26½-mile, 8⅝-in. line to carry natural gas to the Clinton, Iowa area and to direct Natural Gas Pipeline Co. of America, Chicago, to furnish a supply of gas for the project. Cost is estimated at $749,000. Interstate now serves manufactured gas in Clinton.

Abandonment and transfer of natural gas facilities in West Virginia by Monongahela Power Co., Fairmont, W. Va., State Line Gas Co., Point Marion, Pa., and Hope Natural Gas Co., Clarksburg, W. Va. were approved early last month by FPC. Hope will acquire Monongahela's system in four counties for $2,369,351 and will then furnish requirements of State Line over and above deliveries now available to that company.

More than 100 Worthington uniflo gas engine compressors, designed particularly for gas pipeline service, have been ordered by major pipeline companies since January 1950 when Tennessee Gas Transmission Co., Houston, placed the first one in operation. Hobart C. Ramsey, Worthington president, said that this volume of new business has contributed substantially to the firm's backlog of unfilled orders.

On Dec. 5 the Alberta Petroleum and Natural Gas Conservation Board reserved decision on an application of McColl-Frontenac Oil Co. Ltd. and Union Oil Co. of California for a permit to export natural gas from wells in southeastern Alberta for consumption in Montana.

Bethlehem Supply Co., Tulsa, and Bethlehem Supply Co. of California, Los Angeles, have been appointed distributors of welding fittings and flanges by Tube Turns Inc. of Louisville, Ky. The two firms are subsidiaries of Bethlehem Steel Co. and Bethlehem Pacific Coast Steel Corp., respectively. George Tompson is president of the Tulsa company and Wendell M. Jones heads the one in California.

Ladish Co., Cudahy, Wis. has announced the establishment of a Tulsa branch office at 405-406 Thompson Bldg. for distribution of its forged and seamless welding pipe fittings. G. E. Mahoney, who has been Chicago district manager for the past three years, is manager of the new office. At the same time,

Ladish announced a new address for the St. Louis office — Suite 1605, Continental Bldg., 3615 Olive St.

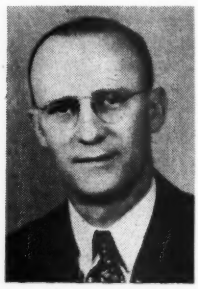
An FPC examiner's illness last month caused a change in the commission's handling of the problem of what company is to serve gas in northeastern Ohio. Glenn R. Law was hearing the case involving Grand River Gas Transmission Co. and Lake Shore Pipe Line Co., both of Cleveland, and Erie Gas Service Corp., Oil City, Pa., and was to have filed an initial decision, but FPC will now render the decision direct. Approval of an allocation of 17 MMcf per day by Tennessee Gas Transmission Co. to any one of the companies was rendered by the commission in November in connection with the New England docket.

When President Gardiner Symonds of Tennessee Gas Transmission Co. recently officiated at ceremonies dedicating a new four-span crossing of the Mississippi river at Greenville, Miss., it signified more than the opening of the four 26-in. lines through which a billion cubic feet of gas will flow every day. To the citizens living in the area, it meant the dropping of toll charges on the highway bridge which carries the pipes. When TGT decided to build the four lines, replacing two which had previously been laid on the same bridge, the increased stress required strengthening of the structure, which TGT paid for; but in addition, the gas company agreed to pay an annual rental on the bridge (which is owned by the city) sufficient to retire bonded indebtedness. Thus —no more tolls.

PIPELINE NEWS

John M. Hanley

Hiram J. Carson



Joe T. Innis

Larry Shomaker

. . . a move up the ladder at Northern Natural

Five officers have been elected by the Northern Natural Gas Co. (Omaha) board of directors. They are HIRAM J. CARSON, vice president in charge of operations, as first vice president; JOE T. INNIS, superintendent operations, to succeed Mr. Carson; LARRY SHOMAKER, superintendent of gas sales, as vice president in charge of sales; JOHN M. HANLEY, production department head, as vice president in charge of gas supply; and MYRVEN L. MEAD, rate engineer, as assistant to the president.

ELISHA R. TRUMAN has succeeded J. C. LYNN as superintendent of production-transmission division No. 1, The Manufacturers Light & Heat Co., Pittsburgh. Mr. Lynn retired recently. CLAIR E. DAVISON has replaced Mr. Truman as foreman in charge of the Kane and Brookville area.

Retirement of HARRISON F. CARR, New Orleans district manager for United Gas Pipe Line Co. and Union Producing Co., Shreveport, was announced recently. J. B. STOREY, assistant district manager at New Orleans for several years, has taken over Mr. Carr's duties.

United Gas Corp. has named GEORGE LOKER superintendent of the Carthage, Texas, plant. He replaces R. G. MURRAY JR., who has been transferred to the company's general offices in Shreveport as technical engineering advisor. Mr. Loker was associated with the Carthage plant in 1947,

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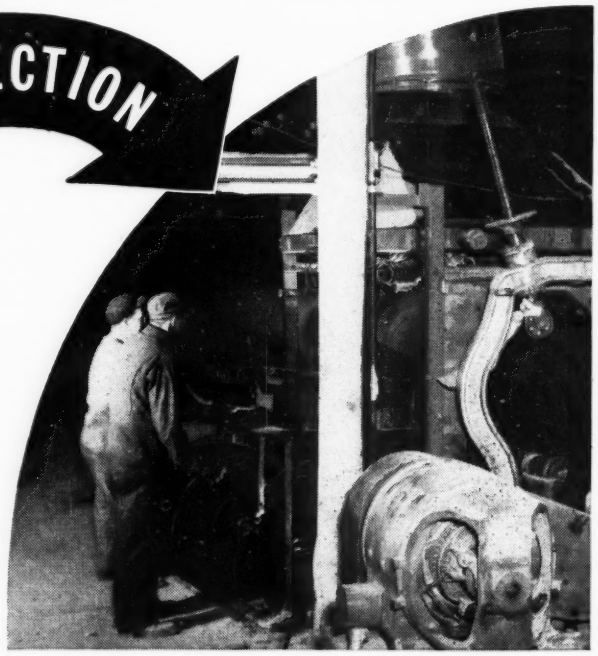

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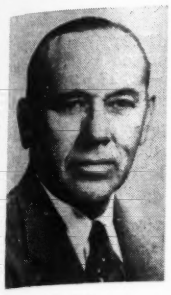
leaving to become foreman of the Karnes City plant.

J. K. ADAMS of Houston has been appointed manager of Texas Eastern Production Corp.'s land and lease department. The firm is the exploration and producing subsidiary of Texas Eastern Transmission Corp.



J. K. Adams
...Texas Eastern

W. R. Leopold
... Worthington

Appointment of WILBUR R. LEOPOLD as assistant to Vice President T. CRUTHERS of Worthington Pump & Machinery Corp., Harrison, N. J., was announced recently. Mr. Leopold was manager of the company's Detroit office, which position will now be filled by CLARENCE S. WENTWORTH.

Progress Reports

Planned

ALGONQUIN GAS TRANSMISSION CO., Boston, facilities to serve designated companies in Mass., R. I., Conn., and N. J. when adequate gas supplies are proved.

ARKANSAS-MISSOURI POWER CO., Blytheville, Ark. To build line from Big Inch to serve 12 towns in two states. To start within year.

ATLANTIC GULF GAS CO., 1500 miles, Alabama to Florida, Georgia, South Carolina.

CAROLINA NATURAL GAS CORP., Charlotte, N.C., 470 miles, 11 lines, from Transcontinental Gas Pipe Line Corp. main line to North and South Carolina communities.

CENTRAL WEST UTILITY CO., Kansas City, Mo. for 30 miles of 12-in. from its system in Clay county to Cities Service facilities at boundary of Kansas City.

CITIZENS GAS CO., Stroudsburg, Pa., **BANGOR (PA.) GAS CO., PEN ARGYL GAS CO.,** subsidiaries of Penn Fuel Gas Inc., laterals to receive gas from Manufacturers Light & Heat Co.

CITY OF TRINIDAD, COLO., a 35-mile, 8⅝-in. line from Colorado Interstate's facilities to a distribution system to be built in Trinidad.

CONSUMERS GAS CO., Toronto, Can., 85 miles, Buffalo to Toronto.

EL PASO NATURAL GAS CO., to increase deliveries to Phoenix, Ariz., 31 miles 16- and 10-in.; 11.5 miles 4½-in.; 5.5 miles 12¾-in.; six metering and regulating stations.

GEORGIA NATURAL GAS CO., Albany, Ga., Phenix City, Ala., to Tallahassee with laterals and branches. $5.1 million.

INTERSTATE POWER CO., Dubuque, Iowa. 26½-mile 8⅝-in. line to the Clinton, Iowa area. Includes a submarine crossing of the Rock river and a double submarine crossing of the Mississippi.

IOWA-ILLINOIS GAS & ELECTRIC CO., Davenport, Iowa for 1½ miles of 8-in. line across the Mississippi river between Bettendorf, Iowa and Moline, Ill. A suspension bridge would carry .7 mile of the line.

JERSEY CENTRAL POWER & LIGHT CO., Asbury Park, 7 miles.

KANSAS-NEBRASKA NATURAL GAS CO. INC., Phillipsburg, Kan. for 3 compressor stations at Holcomb & Albion, Kan. and Grand Island, Neb. totaling 3570 hp; extra 2000 hp at Palco station; cooling and dehydration equipment; replacement of 89½ miles of line with larger pipe; 425½ miles new line.

LAKE SHORE PIPELINE CO., ERIE GAS SERVICE CO. INC., and GRAND RIVER GAS TRANSMISSION CO., pipelines from a Meadville, Pa., connection with Tennessee Gas Transmission's line westward to Ohio.

MIDSOUTH GAS CO., Little Rock, 240 miles northerly from Helena, Ark.

MISSISSIPPI RIVER FUEL CORP., St. Louis,. 22,000 hp in 8 authorized compressor stations and 5500 hp in a new one.

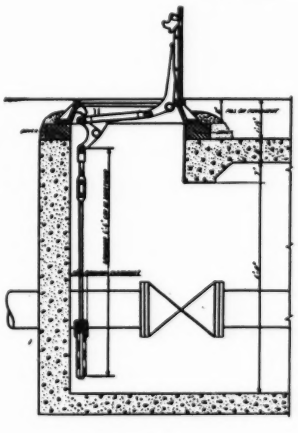
MISSOURI CENTRAL NATURAL GAS CO., Macon, Mo., 60 miles 6-in. from near Hannibal, Mo. to Macon.

NEVADA NATURAL GAS PIPE LINE CO., 114 miles of 10¾-in. line from Topock, Ariz., to Las Vegas, Nev. Includes a 4-in. branch starting 4½ miles west of Boulder City and a 2½-in. branch from 2½ miles west of Needles into the city. To be finished early as possible in 1951.

NEW RIVER GAS CO., Radford, Va., 50-mile line from Atlantic Seaboard's system in W. Va. to a point near Radford with laterals to four towns.

NIAGARA MOHAWK POWER CORP., Syracuse, N. Y., 55-mile, 10¾-in. line to supply Watertown and other communities. Stub laterals and loops to serve Albany, Utica, and vicinities include 45 miles of 6- to 16-in.

NORTHERN INDIANA FUEL & LIGHT CO., Auburn, Ind., 31-mile, 8⅝-in. line to carry gas to northeastern Indiana. Cost: $511,315.



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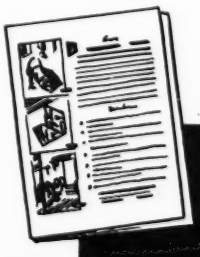

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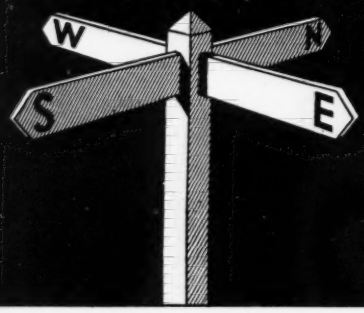

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NORTHWEST NATURAL GAS CO., for 700 miles in Washington, Idaho, Oregon.

OKLAHOMA NATURAL GAS CO., Tulsa, 40 miles of 16-in. from "Golden Trend" area to near Chickasha; 52 miles 26-in. from West Edmond field to new Depew storage project.

PACIFIC NORTHWEST PIPELINE CORP., 2175 miles of 26-in. from southern Texas to Seattle, Wash., Vancouver, B.C., via Oklahoma, Kansas, Colorado, Wyoming, Idaho, Oregon, Washington.

PUBLIC SERVICE CO. OF COLORADO, pipeline from the Piceance Creek field in western Colorado to Grand Junction and Rifle.

PUBLIC SERVICE CO. OF NORTH CAROLINA INC., Gastonia, 365 miles connecting at 10 points with Transcontinental main line in North and South Carolina.

SHENANDOAH GAS CO., Lynchburg, Va., for 49 miles from near Cedarville, Va., to cities in Virginia and West Virginia.

SOUTH CENTRAL ALABAMA NATURAL GAS CO. INC., 150-mile pipeline from a connection with Southern Natural's line in Elmore county.

SOUTH GEORGIA GAS CO., Atlanta, for 527 miles from northern Georgia into Florida to serve new markets in the two states.

SOUTHERN CALIFORNIA GAS CO. and **SOUTHERN COUNTIES GAS CO.,** Los Angeles, on their 20- and 22-in. loop line from the Goleta dry gas field to L. A. SoCounties will complete its section in 1951 with a line from near Summerland to Goleta. SoCal will build a 21-mile loop from the Santa Clara river to the Simi tie-in.

SOUTHERN NATURAL GAS CO., Birmingham, 105 miles 10¾-in., Bolingbroke, Ga. to Aiken, S.C.; 19 miles 8⅝-in., 29 miles 12¾-in. Carthage, Texas, to Logansport, La.; 78 miles 14-in., Logansport to Perryville, La.; 40 miles 24-in. loops; 9000 hp in various compressor stations.

TENNESSEE GAS TRANSMISSION CO., Houston, 45-mile spur from Buffalo, N. Y. to near Niagara Falls, N. Y. Also 266 miles loops between Texas & New York, 100 miles of laterals, 72,000 hp to be added, and crossing of Niagara river.

TEXAS ILLINOIS NATURAL GAS PIPELINE CO., Chicago, to build during 1951 100 miles 30-in. from Effingham to Sibley, Ill. and 92 miles 30-in. from Sibley to Joliet.

TEXAS EASTERN TRANSMISSION CORP., Shreveport, to boost capacity to 476 MMcf, 791 miles 30-in. from Kosciusko, Miss., to Connellsville, Pa.; seven compressor stations with 46,400 hp on new line, six with 52,500 hp on existing line; short lines in New York area.

TRANSCONTINENTAL GAS PIPE LINE CORP., Houston, 11-mile mainline extension, 20- to 26-in. pipe, East Carteret, N.J., to Brooklyn. 17 miles 30- and 10¾-in. from Bergen county, N.J. to Paterson, N.J.

UNITED GAS PIPE LINE CO., Shreveport, 1005 miles in Texas, Louisiana, and Mississippi. Includes 451 miles 30-in., 6 miles 26-in., 53 miles 24-in. from Agua Dulce field in south Texas to Monroe, La.; about 245 miles of 30, 26, 24, and 20-in. from Gulf of Mexico northeast to Jackson, Miss.; 215 miles from this line to near Kosciusko, Miss.; 24 miles 8, 12, and 16-in. in south Louisiana; 16 miles of 16-in. from Koran gasoline plant site, La., to its Carthage-Sterlington line in Louisiana; 4000-hp compressor, dehydration plant.

UTAH NATURAL GAS CO. to build a 360-mile line from the San Juan basin to Salt Lake City. A secondary line would run from Last Chance field (Wayne county, Utah) through Sevier and Sanpete counties.

UTAH PIPE LINE CO., Dallas, for a 392-mile line from Aztec, N. M. to Salt Lake City. Includes 374 miles of 22-in. and 18 miles of 16-in.

VALLEY GAS PIPE LINE CO. INC., Houston, $144.5 million, 1000 miles of 30-in., from Hardin county, Texas, to southern Michigan, plus 500 miles of 24-in. in Texas and Louisiana, plus laterals, two 13,500-hp compressor stations, plus others aggregating 70,000 hp. Wants to start by Dec. 31, complete April 1, 1952.

WESTCOAST TRANSMISSION CO. INC., Wilmington, Del., 615 miles, including 277 miles from Sumas, Wash. to Portland, Ore. with short branches to a number of cities in the two states; 266 miles south from the Osoyoos, B.C. area to Spokane and Hanford, Wash.; and 72 miles of laterals and 13 measuring stations.

Approved

CITIES OF BOONEVILLE, RIPLEY, BALDWYN, Miss., to connect with Tennessee main line in Benton county, 16 miles of 6-in., 23 more miles, 11-mile tap.

PIEDMONT NATURAL GAS CO. INC., Spartanburg, S. C., six laterals totaling 74 miles from Transcontinental main line to North and South Carolina cities.

SOUTHEASTERN MICHIGAN GAS CO., Chicago, 55 miles of 12-in. from connection with Panhandle Eastern main line in Oakland county, Mich., to Marysville, Mich.

TEXAS ILLINOIS NATURAL GAS PIPELINE CO., Chicago, to build 72 miles of line in Texas and change compressor units to boost capacity.

Under Way

NEW YORK STATE NATURAL GAS CORP., New York, 164 miles of 16-in. from Dryden to Albany, N.Y.; 56-mile line from Dryden terminus to a storage pool in Tioga county, Pa.; facilities for a new storage pool. Also 44½ miles of 16- and 18-in. to connect the Leidy gas field with its system in Penn.

NIAGARA MOHAWK POWER CORP., Syracuse, 7.4 miles 16-in. and 3 miles 12-in. from New York State Natural's Albany line to Niagara's Utica-New York system. 15.3 miles connecting New York State's system with Niagara's Albany county facilities.

NORTHEASTERN GAS TRANSMISSION CO., Boston, 400 miles of line from Tennessee Gas Transmission Co.'s system near Pittsfield, Mass. to Transcontinental's system near Greenwich, Conn. and metering and regulating facilities. To serve companies in Conn., Mass., and N.H.

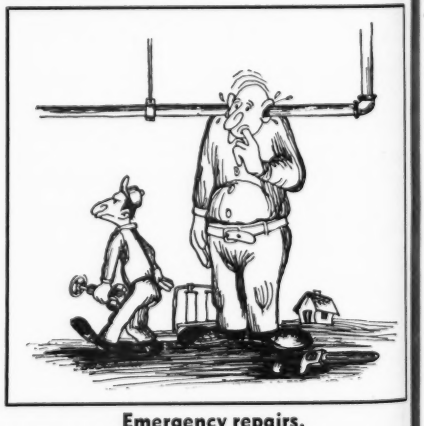
SOUTHERN NATURAL GAS CO., Birmingham. Ford, Bacon & Davis to build two Mississippi taps and install 11,000 hp in existing stations.

TENNESSEE GAS TRANSMISSION CO., Houston, 303-mile extension from Erie county, N.Y. to N.Y.-Mass line; 787 miles of loop along existing or authorized line from Texas to Buffalo; 111,680 hp in existing, authorized, or new compressor stations; 75 miles of laterals.

TEXAS EASTERN TRANSMISSION CORP., Shreveport, 35 miles of 30-in. from Fayette county, Pa. to Westmoreland county, Pa.

TEXAS-ILLINOIS NATURAL GAS PIPELINE CO., Chicago, on its 1331-mile line, to Midwestern Constructors Inc., 100 miles of 30-in. from Mississippi river near Chester, Ill. to Effingham, Ill., 28% completed; 100 miles 26-in. LaGloria to Refugio, Texas, 35% completed; crossing of the

PIPE DOPE . . .



Emergency repairs.